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Library Furniture and Equipment

PROCEEDINGS OF A THREE-DAY INSTITUTE

conducted at Coral Gables, Florida, June 14–16, 1962

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Foreword

The American Library Association through its divisions has traditionally sponsored Building and Equipment Institutes, usually on a biennual basis.

In 1962 the Library Administration Division departed from the usual procedure and sponsored an Equipment Institute. The division's Equipment Committee and the Library Technology Project co-sponsored this Institute. Interest in the Equipment Institute was wide spread. The papers, discussion and the unique exhibit were well received. For the first time the librarian had an opportunity to examine furniture and equipment not in widely separated areas in an exhibit hall, but in a single area where equipment was displayed by types, i.e., shelving arranged together, all card catalog cabinets arranged together, etc.

The success of the Equipment Institute held at the University of Miami encourages us to plan a separate Equipment and Buildings Institute to be held in alternate years.

The sequence of the papers in these proceedings differs slightly from the order in which they were presented (see program). The change was made for better continuity. These proceedings were edited by Edward Johnson, Technical Editor, Library Technology Project; Frazer G. Poole, Director, Library Technology Project; and the undersigned.

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Program

THURSDAY, JUNE 14, 1962

1:00 to Registration Check-in
5:00 p.m. Lobby, Residence Hall "720"

6:00 to Banquet Meeting
7:45 p.m. Student Service Center

Presiding:
Thelma Reid
Chief Librarian, City Schools Library
San Diego, California

Welcome to the University
Archie McNeal
Director, Otto F. Richter Library
University of Miami
Coral Gables, Florida

Addresses:
FURNITURE SELECTION FOR THE LIBRARY
Martin Van Buren
Interior Planning Consultant
Charlotte, North Carolina

Edna Voigt
Library Consultant, Library Bureau
Remington Rand, New York

Edward G. Stromberg
Designer, John E. Sjostrom Co.
Philadelphia, Pennsylvania

9:30 p.m. Library Tour and Social Hour

FRIDAY, JUNE 15, 1962

7:30 to Breakfast
9:00 a.m.

8:30 to Registration Check-in
10:30 a.m. Lobby, Residence Hall "720"

9:00 to Visit Exhibits
10:30 a.m. Otto G. Richter Library

10:00 to Coffee Break
10:30 a.m. Otto G. Richter Library

10:30 to Morning Program
11:45 a.m. University College Building, Room 110

Presiding:
Forrest Carhart
Asst. Director, Library Technology Project
American Library Association

Address:
EQUIPMENT AND METHODS IN CATALOG CARD REPRODUCTION
Joseph Treyz
Head, New Campuses Program
University of California, La Jolla

12:15 to Luncheon
1:45 p.m. Student Service Center

1:00 to Visit Exhibits
2:00 p.m. Otto G. Richter Library

2:00 to Afternoon Program
4:00 p.m. University College Building, Room 110

Presiding:
Frazer G. Poole
Director, Library Technology Project
American Library Association

Address:
BOOKSTACK SELECTION IN THE LIBRARY
Keyes Metcalf
Library Consultant
Cambridge, Massachusetts

4:00 to Visit Exhibits
6:00 p.m. Otto G. Richter Library

6:00 to Dinner
7:45 p.m. Student Service Center

8:00 to Evening Program
10:00 p.m. University College Building, Room 110

Panel Discussion:
SPECIFICATION WRITING AND BIDDING PROCEDURES FOR FURNITURE AND SHELVING

Moderator:
William S. Geller
Assistant Librarian, Los Angeles County Public Library
Los Angeles, California

Panel Members:
Librarian's Viewpoint
Hoyt Galvin
Librarian
Public Library
Charlotte, North Carolina

Shelving Manufacturer's Viewpoint
Homer Lombard
Art Metal Construction Co.
Jamestown, New York

Furniture Manufacturer's Viewpoint
Hal Syren
Library Bureau
Remington Rand
New York

SATURDAY, JUNE 16, 1962

7:30 to Breakfast
9:00 a.m. Student Service Center

9:00 to Consultation and Review of Exhibits
11:45 a.m. Otto G. Richter Library

10:15 to Coffee Break
10:45 a.m. Otto G. Richter Library

12:15 to Luncheon
1:45 p.m. Student Service Center

2:00 to Afternoon Program
3:15 p.m. University College Building, Room 110

Presiding:
Frazer G. Poole
Director, Library Technology Project
American Library Association

Address:
EQUIPMENT AND METHODS IN PHOTOCOPYING WITH SPECIAL EMPHASIS ON COPYING FROM BOUND VOLUMES
William R. Hawken
Author, "Photocopying from Bound Volumes"

3:15 to Coffee Break
3:45 p.m. Otto G. Richter Library

3:45 to *Address:*
5:00 p.m. EQUIPMENT AND METHODS IN THE PRODUCTION OF FULL-SIZE COPY FROM MICROTEXT
William R. Hawken

6:00 to Dinner
7:45 p.m. Student Service Center

8:00 to Panel Discussion
10:00 p.m. University College Building, Room 110

A CATCH-ALL QUESTION AND ANSWER PERIOD ON EQUIPMENT WITH A PANEL OF EXPERTS IN AS MANY FIELDS AS POSSIBLE

Moderator:
William S. Geller
Assistant Librarian
Los Angeles County Public Library
Los Angeles, California

Panel Members:
Forrest Carhart
Hoyt Galvin
William R. Hawken
Homer Lombard
Keyes Metcalf
Frazer Poole
Edward G. Stromberg
Hal Syren
Joseph Treyz
Martin Van Buren
Edna Voigt

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Introduction

The Library Administration Division's Building and Equipment Section and the Library Technology Project co-sponsored the Equipment Institute held at the University of Miami, Coral Gables, Florida, June 14-16, 1962. William S. Geller, Assistant Librarian of Los Angeles County Public Library, and Frazer G. Poole, director of the Library Technology Project of the American Library Association were co-chairmen of the institute which was attended by 261 registered delegates. Beside librarians from all types of libraries, the delegates included architects and building consultants, representatives of manufacturers, and library trustees. Sessions began Thursday evening and ended Saturday after the evening session.

Following a banquet in the Student Service Center, the participants moved to a more comfortable and air-conditioned auditorium of the recently completed Otto G. Richter Library. Here, University Librarian Archie McNeal welcomed the delegates to the University of Miami campus. The speaker for the evening was Martin Van Buren, library consultant, of Charlotte, North Carolina, who discussed "Furniture Selection for the Library." The topic was further developed by Edna Voigt, library consultant, Remington Rand; and Edward G. Stromberg, designer, John E. Sjostrom Co. Frazer G. Poole was the moderator.

Friday morning began with a visit to the exhibit area set up in the library. Possibly the most distinctive feature of this initial Equipment Institute was the arrangement of the exhibit area by type of equipment rather than by manufacturer. Though about 35 of the principal manufacturers of library equipment were represented, their wares were interspersed, all book trucks being in one area, all tables and chairs in another, etc. This was true as well as for book stacks (wood, and both bracket- and case-type steel shelving), and 60-drawer catalog card cabinets. There were also copying equipment and micro-readers and printers as well as laminators and book labeling equipment displayed.

Since this large exhibit was available in the new undergraduate library within 50 feet of the auditorium where the talks and panels took place, the participants were given ample opportunity to observe and compare equipment and ask questions. Incidentally, the spacious new library, because of its beautiful new furniture, unusual floor covering, and other distinctive features, came in for its share of attention and recognition. Eugene Salmon of the LTP did an excellent job in organizing the exhibit area.

During the mid-morning program, Forrest Carhart, assistant director of the Library Technology Project, introduced Joseph Treyz, Head, New Campuses Program, University of California, who spoke on "Equipment and Methods in Catalog Card Reproduction."

During the afternoon program Keyes Metcalf, library consultant, Cambridge, Massachusetts, described the various types of shelving available.

The evening panel discussion on "Specification Writing and Bidding Procedures for Furniture and Shelving" was moderated by William S. Geller; panel members were Hoyt Galvin, Librarian of the Charlotte, North Carolina, Public Library, Homer Lombard, Art Metal Construction Company, and Hal Syren, Remington Rand.

Saturday morning was made available for additional consultation with the exhibitors.

Frazer G. Poole introduced William R. Hawken, document reproduction consultant, Berkeley, California, and author of *Photocopying from Bound Volumes*, who was the speaker for both sessions Saturday afternoon.

The institute held its closing session after dinner on Saturday evening. William S. Geller moderated a panel including all the speakers, moderators, and panel members of the institute. This program provided an opportunity to ask questions from the panel of experts in many fields. To avoid delay, the delegates were asked to submit their questions on slips provided for this purpose before the program. Typical questions were asked such as: "Have there been any reports on the use of carpets in any libraries?" "Are there inexpensive photocopy machines simple enough for self operation by college students?" and "What device is recommended to monitor necking and petting in the stacks of university libraries?" The delegates felt that they learned a great deal about problems during this two hour catch-all question-and-answer period.

Charles L. Morgan was the chairman of the Local Arrangements Committee, and was responsible for the excellent accommodations. The delegates to the institute were comfortably housed in one of the dormitories of the University of Miami. Registration and general arrangements were handled by the Headquarters staff of the Library Administration Division, American Library Association.

• 1 •

Furniture Selection for the Library

The first meeting of the Library Equipment Institute convened at 7:30 o'clock on Thursday evening, June 14, with Frazer G. Poole as moderator. The principal speaker for the meeting was Martin Van Buren, Library Consultant, of Charlotte, North Carolina, who presented a paper on furniture selection for the library. Mr. Van Buren was followed by Edna Voigt, library consultant, Remington Rand, and Edward G. Stromberg, designer, John E. Sjostrom Company, who presented further comments on the subject of furniture selection from the viewpoint of the manufacturer. Mr. Poole was moderator for a question-and-answer period following the presentation of the three papers.

MARTIN VAN BUREN: My earliest contacts with that seemingly awesome world of the public library left me with a curious assortment of impressions. I can still recall the ubiquitous hiss of discipline, the magic of the Saturday morning story hour, those saucy rubber stamps perched on the ends of yellow pencils—and once, a single guilt-ridden venture into the adult reading room where I learned with childish astonishment something of the intimacies of Marie Antoinette. But more than that, I remember musty rooms, faded Venetian blinds, darkly stained tables and chairs. The sienna-brown oak shelves somehow made even the books they contained seem dingy, as though one should wipe off his hands after touching them. In memory, the card catalog loomed like a brooding thing and the paneled barrier of the charging desk in itself threatened silence. More than anything else, it was the *atmosphere* of the library that my memory retained most vividly.

Yet in all my recollections—childishly exaggerated I am sure—one point remains clear. The dark dryads of furniture did not seem out of place; they belonged. I could never imagine anything different in the surroundings, the building, in which they reposed. Thus, I believe that even in memory, a principle asserted itself: the furniture that appears in a library—or in any building for that matter—should reflect the essence of the building of which it is a part.

For that reason I believe it is futile to begin a discussion of library furniture without first exploring the character of library buildings in America, what made them the way they were, and what characteristics they possess today. The chronology is not without touches of irony, and at times even drama.

Early libraries in America had no choice but to imitate patterns of their European predecessors. Smaller libraries consisted of a central reading room around which were alcoves containing the book stacks. But as America grew and the need for larger libraries became apparent, this arrangement was too restrictive. Planners turned to more imposing European examples, such as the Bibliotheque St. Genevieve and the Bibliotheque Nationale—both erected in Paris during the middle 1800's—and to a lesser degree, the British Museum, completed in 1857. These buildings employed a large reading room distinctly segregated from a vast utilitarian stack area. However, as Burchard and Bush-Brown point out in their book, *The Architecture of America,* "None of the executions of this plan was appropriate for American purposes, since they were designed for the comfort and peace of the sophisticated scholar and not for the omnivorous reading and browsing habits of a half-literate general public which could hardly be trained to use a card catalog." Examples of these early plans achieved impressive architecture but contributed little to library operation, a matter which seemed of little concern to practicing architects of that day.

The first stir of discontent appeared in 1882 when the American Library Association met in Cincinnati. During that meeting it was resolved that, "In the opinion of this Association the time has come for a radical modification of the prevailing typical style of library building, and the adoption of a style of construction better suited to economy and practical utility." The resolution received little public notice at the time, and it was not until 1888, when C. A. Cutter asserted in the *Library Journal* that the architect was the librarian's natural enemy, that reaction was aroused. But to little avail; the architects indignantly proclaimed librarians "enemies of the arts," and clung to their classic goals.

However, like a wind before a storm the crusade was gaining momentum. In 1885 an article in the *North American Review* stated, "A very large number of (public) buildings testify to the undoubted fact that the outside has been the one problem considered, the inside details being left to develop themselves. There are no public buildings of which this criticism is truer than it is of public libraries."

Then the storm broke. Aroused by the advent of Boston's pompous new library in 1895, librarians turned critic and openly lamented the fact that architects were sacrificing use and function of the library to superficial monumentality. Their determination resulted in the American Library Association's "Elemental Principles of Library Planning," which included the following points:

1. Interior arrangement should be considered before the exterior is planned.
2. Plans should provide for future growth and expansion.
3. A library should be planned for economic and efficient administration.
4. Public rooms should be planned for complete supervision by the fewest possible attendants.
5. Efficient arrangement should not be sacrificed to architectural effect.
6. Decoration should be simple.
7. Planning should consider economy of reader's time.
8. Ample natural light should be provided.

Following this cogent statement came an unexpected voice of sympathy in the *Library Journal* of 1901, when J. L. Mauran, a practicing architect, prescribed a three-point approach to library planning: "Select a librarian; select an architect; design the interior first."

But these provocations had little effect; in 1905 the public library in Washington went up, a structure that Burchard and Bush-Brown describe as, "A mammoth affair in the new classic vein, self-indulgent of decoration, haughtily ignorant of utility." Occasionally, other voices were raised, such as John Cotton Dana's strangely prophetic, "Build a shell and be able to change it at will." But these, too, were ignored.

It seems strange, in retrospect, that it should be the librarians rather than the architects who sought simplicity and function in their buildings. Also it is paradoxical that although American library design continued its march to monumentality even through the Carnegie era, the very libraries that had been held up as models—the Bibliotheque St. Genevieve and the Bibliotheque Nationale—were significant forerunners of the architecture that was to come. Both buildings displayed a daring use of iron, the first such attempts in important public buildings. Slender iron columns were left exposed and were so engineered that no stress was put on walls. Thus the architect for both buildings, Henri Labrouste, contributed substantially to skeletal construction systems that were to open new dimensions to the art and science of architecture.

During those years library furniture remained an almost forgotten stepchild amidst the struggle for more realistic planning of library buildings. Typically, its design followed the vision of the buildings that embraced it. Equipment was mostly of oak, stained dark, and was amply embellished with carving, paneling, and other decorations. Everywhere classic themes were rampant. Little thought was given to improving function and library furniture remained for the most part a chauvinistic idyl of the past. Tones were dark, scale ponderous, character oppressive.

But conditions were not to remain static indefinitely. Whether the bluster from Boston began to take effect or whether influences came from other sources, a reversal in attitudes began to take place. In the *Library Journal* of December, 1923, architect Henry Carlson made the following comments: "Personally, the idea of quiet in a library seems to me overdone; it is not a church or a mausoleum, and I like it to be a cheerful place.... To my mind the stack is a regrettable necessity to the growth of a library, and I wish it were possible to have all books on open shelves and accessible.... Beware of the architectural library; each protruding ornament means just one more expense of upkeep...."

What a startling revelation that was!

Four years later, in 1927, one of the most notable revolutions in library planning was exemplified in Alvar Aalto's public library in Viipuri, Finland. Although virtually ignored at the time, the building was later to become recognized as one of the most significant architectural achievements of this century. The library is notable for its ingenious control of natural light which gives a soft diffused glow over the entire reading area. In other respects as well, the Viipuri library reflects contemporary attitudes in planning, and its essential openness and flexibility make it comparable to many libraries being erected today.

Library furniture, too, showed symptoms of change. Sienna-hued oak lightened to dirty yellow; massive table legs went on a diet; surfaces were denuded of carvings. In book stacks, steel had come into its own and miracles of engineering were taking place. Mass production techniques offered promise of the economies of standardization and probed concepts of modular construction in furniture. Green's multi-tier book stack system, developed in 1889 for the Library of Congress, was already an established production standard. And crystal-ball conjectures prophesied an even more dazzling future, as witness the following from the *Library Journal* of May, 1921: "Will the card catalog of the future be oral? Will a trained ear listen at the 'SH' phone until 'Shakespeare' sounds, then press a button which will click into view an indication of the volume sought? Or will it be piano-keyboard style where manipulations of keys will bring an accurate and instantaneous service, such as cash registers?"

Such prophesies were not mere speculation. Various devices appeared on the market, such as the Snead Automatic Book Distributor of 1930, some ingenious, others merely clever. Nevertheless there was a restlessness in the air.

Aside from the practical reality of steel book stacks, many of the devices were dreams of a categorical nature. In the meantime, the hard facts of library operation persisted. Books had not only to be stored, but cataloged and circulated as well. Patrons had to be accommodated. Reference material had to be dealt with. Libraries had to be administered. In keeping with the changes that were taking place in library architecture, a general assessment of qualities of library furniture was in order. W. L. Yust, in the June, 1926 issue of *Libraries* (later quoted in Wheeler and Githens) offered his "10 Commandments of Library Furniture." They are worth repeating here:

1. Purpose—prompt easy accomplishment of work, free from physical distractions.
2. Material—wood (oak): metal for multi-floor stacks, staff desks, card catalog cabinets in non-public rooms, and vertical files.
3. Dimensions—use standard dimensions for expansion, flexibility.
4. Design—simple, comfortable, dignified, and beautiful. Avoid extremes. Free from elaborate carving, sharp edges and corners that injure or chip easily.
5. Construction—of approved style according to methods developed by library experience, giving strength and durability.
6. Finish—varnish, wax, fume, paint, and enamel.
7. Color—light; avoid dark. Light shades diffuse light, are more cheerful, easier to keep clean.
8. Price—better to get less and get the best than compromise.
9. Manufacturer—reliable and experienced.

(Note: Wheeler-Githens lists only nine; I have not ascertained what became of Yust's 10th).

Although some of Yust's requisites might be subject to qualification today, it is significant that some attempt was made at the time to define standards of quality that might serve as a guide to librarians and purchasers of library furniture, for up to that time, remarkably little had been written on the subject. Whether this was because library furniture was considered a subject too commonplace to require comment, or whether it was taken for granted that library furniture had already reached its ultimate solution, one cannot say. In any case, Yust seemed to be searching haphazardly without benefit of a basic thesis.

To begin at the beginning, we might ask: What are we seeking in the realm of library furniture? Tools, perhaps, that will better enable us to carry out the functions of our libraries, not only today but in the years to come? Tools that also give us a sense of pride and pleasure in their very existence? What, then, ought to be the essence of these tools?

One effort to approach a basic conclusion on qualities of library furniture was made when Hoyt Galvin and I suggested the following evaluation in our UNESCO manual on library planning: furniture should be functional, it should be durable, it should be beautiful. Other factors such as cost naturally have a bearing, but do not these three elements provide a basic thesis?

The definition is not original. It has always been the measure of successful architecture, dating back some 2,000 years when Vitruvius described these factors as utility, strength, and grace. The words differ but the meanings are identical, and they apply with equal importance to any artistic endeavor that serves a special need, whether it be architecture or the less romantic but no less utilitarian province of library furniture.

The first of these requirements, function, simply indicates what the object in question is supposed to do—how efficiently it performs its task. Comfort, convenience, and serviceability relate to function. Any competent designer begins with questions of function, then seeks methods of performing those functions better. Indeed, the much-discussed "written program" for a library building is essentially a statement of functional requirements, and the early struggle between librarians and architects over the execution of their buildings was one of function versus beauty—esoteric beauty, perhaps, but nevertheless beauty.

When architect Louis Sullivan made his classic statement that "Form Follows Function," aesthetes were dismayed at the idea that the pagan god of utility should dominate their sacrosanct domain of beauty: they argued the point vigorously and still do. Yet Sullivan was not deserting the proponents of beauty: he was merely stating that utility is the more definitive and restrictive of the two elements and therefore must be the derivative force. Artistry, being limitless and beyond inhibition, could still offer vast freedom of expression. Perhaps Sullivan was taking too much for granted in assuming that today's designer could cope with both.

Thus it is essential that we learn to view the quality of function as an objective within itself, to be correlated with the elements of beauty and durability only after its own problems are understood. In public libraries such a viewpoint is certainly obvious, for the function of its operation and furniture is quite apparent. Until the science of electronics and computer systems revolutionizes library operation, the basic function of its equipment will remain essentially the same, and any improvements in library furniture design must be technological improvements evolving from identical functional requirements. Even so, what a vast realm of unexplored possibilities presents itself!

Function exists as a quality only as long as its utilitarian values remain. When structural weaknesses occur—when tables wobble, chairs sag, card catalog trays stick—then function fails. Thus durability assumes a vital role in the basic quality of library furniture. Inherent sturdiness is a factor that not only sustains the elements of function (and also beauty), but concerns economic aspects of maintenance and eventual replacement as well. This is a point not to be overlooked; the lasting durability of its furniture is of particular importance in a library which is exposed to public use and abuse for countless hours, week in and week out.

Much too often in the selection of library furniture initial strength becomes the sole criterion of durability. "Look how *strong* this is!" cries the salesman as he hammers frantically on his latest pride-and-joy. But what of tomorrow, of next year, and the years after that? How well will this pride-and-joy resist burns, stains, scars, loosening of joints, fading, cracking, splitting, warping, or downright collapse?

The prognosis is not a facetious one. Nor is it one that requires further comment, for the quality of durability seems to be the one element most deeply rooted in the consciousness of librarians and members of building committees. The sturdy oak chair of the past has left its mark—an almost ineradicable mark—on the library scene. The impact is not without merit and might prove conclusive if durability were the only concern of the public library—its sole responsibility to the community it serves. But as in the past, when architectural beautification alone proved insufficient as a means to successful library buildings, so does the element of durability by itself fail to achieve that which we seek.

The third quality, beauty, is not so simple to explain. The dictionary describes beauty as that quality which gives pleasure to the senses or pleasurably exalts the mind or spirit. The enigma behind such a definition is that the quality which pleases one individual might not please another, and we are faced with that fanciful pixy known as "taste." Battles have been fought over this conundrum and the fact that "taste" is a matter of education appears of little help in resolving differences.

Attempts have been made, without much success, to define beauty in practical terms. Reference is often made to scale, line, style, proportion, balance, and so forth, without arriving at a neat conclusion. There is one vital element of beauty, however, that is of particular importance: that is an harmonious relationship of parts to the whole. In the case of library furniture, this is important not only within the inherent elements of the design itself but also in the design relationship of furniture to the architectural character of the building of which it is a part. The secret of any beautiful library lies in this harmonious blend of visual elements which together add up to a graceful result. Therefore, in selecting furniture for a public library, look first to its architectural concept, envision the scale of its areas, and the atmosphere to be achieved.

These comments on beauty are an oversimplification; they are not enough. Perhaps we must resign ourselves to the comment made by a prominent art critic who remarked that any example of true beauty possesses "that certain something" which reaches beyond the basic rules.

In our quest for the meanings of beauty, durability, and function, an example might be made of the new United Nations Library in New York. Although not a public library, its furnishings nevertheless provide an interesting analysis.

As for beauty, it is a triumph. No efforts were spared in its aesthetic execution, both as to architecture and furnishings. The built-in card catalog in the Woodrow Wilson Room—some thirty feet long—is truly elegant with its rare African wenge wood face and trim. In the main reading area, shelving and furniture are of beautifully finished white oak. Rugs of special design lie thickly beneath graceful tables and chairs. Although costly, the important element to note is the congruity of the library's furnishings with its architectural atmosphere. A certain serenity of character was obviously intended and successfully achieved by the use of natural woods and soft colors. Here indeed is an atmosphere conducive to serious study, reflecting the dignity that such a library should possess.

As for durability, no judgment can be made at this time. Much of the library furniture, including shelving, was designed by the architect and construction details cannot be determined by the casual visitor. In any case, extreme durability is not a key issue here; the United Nations library undoubtedly will receive less abuse than the average living room—escaping such exuberances as cocktail parties, pets, and the reckless abandon of the blue-jean set.

The test of function evokes quite a different picture. The handsome card catalog cabinet in the Woodrow Wilson Room is so designed that none of the top row of trays will open—they are blocked by decorative trim! The card catalog in the main reading room, I was told, had to be returned and rebuilt because its original design would not accommodate guide cards. Shelves in the beautiful oak book stacks are not adjustable and thus will not accommodate certain published material, which must therefore be shelved elsewhere; I shudder to think of the complications this must cause in systematic shelving and cataloging! The lending desk adjacent to the main entry is not large enough to permit the needed work stations. Furthermore, the circulation area in front of it is little more than a corridor and is already a bottleneck to patron traffic. How right was James Gerould when he stated in 1932 that, "Architecturally the area before and behind the desk is the most difficult to enlarge!"

To my mind these are grave and inexcusable errors, signifying the failure of an otherwise significant library. The tragedy is magnified by the international significance of this particular library, and I can only speculate that its basic failure was due to the lack of a coherently organized planning team. Could this indeed be a retrogression to the early days of library architecture when prima donna complexes reigned at the cost of coordinated efforts? Although it is commendable that an attempt was made to explore the stylized library furniture that has become such a cliché today, the dereliction was apparently due either to a lack of comprehension of the functional problems involved, or sheer carelessness—quite possibly both.

This is not to claim that standardization is necessarily either a cliché or bad; it is in fact unavoidable in a special environment conditioned by economic necessity to its technology. The struggle for individuality thus becomes one of constantly creating new forms, new uses, new adaptations based upon progressively changing production techniques. This requires imagination, initiative, and vision to prevent the products we create from becoming stagnant, even being caught between a nostalgia for pseudo-images of some distant past and a febrile pursuit of sameness. The latter appears to be true of library furniture today, which has stripped away the ornamentation of its past but accomplished little else. True, the industry has taken advantage of developments in production technique in order to turn out its products more efficiently, or faster, or cheaper, but the products themselves remain essentially the same. Fifty years ago the original Snead Company was producing both standard and bracket type shelving, multi- as well as single-tier, in both steel and iron. Before the turn of the century, the old Library Bureau firm was making wood library equipment that in structure was virtually the same as that produced by library furniture makers today—except that its catalog offered an imported bentwood library chair for $2.50, ... "Domestic Models Slightly Less."

Some fifteen years ago the Cooperative Committee on Library Building Plans, initiated at Princeton University, anticipated radical departures in methods of library operation, taking as its measure spectacular advances in other fields. At that time, during the mid-1940's, the Committee asserted, "The problem of the designer of a library to be built in the next five years is one of planning a building which will suffice if we are limited to the pedestrian resources of present-day practice, and yet one which will not prevent a rapid shift from this practice to take advantage of new instruments." A year later the Committee again expressed its optimism when it urged: "By all means let the librarian become aware of new possibilities...."

Today, almost two decades later, we must still ask, "What 'new' instruments? What 'new' possibilities?"

The need goes deeper than improvements in production efficiency, or alterations in styling, which are nothing more than putting a new fender on an old Ford. It is uncomfortable, here in a nation noted for its product ingenuity, to reflect on the comment made in the London Architectural Review that today's maxim appears to be, "Form Follows Sales."

Where does this leave the librarian faced with the responsibility of selecting furniture for his new library? Unfortunately, he is left with very little to go on other than manufacturers' catalogs and a few elemental principles. A search of the periodical index as far back as 1900 discloses a distressingly meager smattering of references on the subject of library furniture or equipment. With the exception of Wheeler and Githens' estimable document, works on library planning rarely mention the subject of furniture. Four years ago Hoyt Galvin and I sought the aid of UNESCO representatives throughout the world in our search for material on library planning and furnishing; only one volume of note was acquired: German Author Werner Mevisson's *Public Library Building*. A recent search of the New York Public Library's files produced virtually nothing on library furniture. Inquiry of one of Europe's leading book dealers brought a negative reply. The published compilation of the Princeton Cooperative Committee discussions makes no mention of library furniture or equipment, either in context or in its index. The American Library Association's Library Technology Project, although making efforts to assess present library equipment, rightfully has no intention of attempting redesign or improvement of library furniture—the Project's task of mere analysis is monumental enough as it is. On a broader front, Lewis Mumford's exhaustive study, *The City in History*, devotes only a few paragraphs to library systems in general. And Max Lerner's vast sociological work, *America as a Civilization*, does not even mention the word "library" in 950 pages covering every conceivable aspect of American society including our literature and our reading habits!

Not only in its furniture and equipment, but in its total form, is the American public library, past and present, so insignificant that its existence is beyond recognition in any sociological aspect?

To touch on a lighter subject, my search for material on library furniture has not been without its rewards. An essay on library furniture published in 1933 lists the following topics for consideration: drinking fountains; electrical bell communication between lending desk and office; floor heaters; convenient storage of broom and dust pan; location of light switch box; lawn sprinklers; location of master key to building; outdoor signs; location of mail box; importance of picture molding; location of clock; position of outdoor flag pole.

How can one remain frustrated after finding such a gem as this?

In a discussion of such limited length, the broad subject of library furniture can at best comprise generalities, and delineate little more than basic principles. As we pursue the subject through its historical environment to the increasingly complex problems of present-day library practice, the value of professional consultants in this field becomes vividly clear. Such a consultant is an important member of the planning team. However, our purpose here is to offer advice to those librarians who must face the problem of furniture selection alone, unaided by professional help. By way of assistance I have listed a few basic points:

1. At an early stage, develop a comprehensive list of those items of equipment needed to fulfill the functions of the particular library involved; this is the basic "inventory" and should be constantly reviewed and revised as the project progresses.

2. Study thoroughly all available library equipment catalogs.

3. Also study literature and catalogs from furniture makers whose products are intended for other types of institutions, searching for adaptations that might lend themselves to library use. In the words of Philip Wylie, "Think in other categories."

4. Become aware of furniture problems and how they have been solved in other types of institutions. Visit contemporary banks, hospitals, business firms; inquire about equipment problems they have encountered and how they achieved their own solutions. Often such problems have similarities to those encountered in libraries.

5. Maintain a comprehensive file of such observations and their potential application to library furnishing problems; keep notes as to sources and, when available, cost data.

6. Assess every library furniture possibility by applying the tests of function, durability, and beauty.

7. In making final decisions, seek harmony of design and compatibility with the architectural concept of the building—in form, material, color, and finish.

It will be noted that these suggestions encourage an awareness of institutional buildings other than libraries—one interpretation, perhaps, of the Cooperative Committee's admonishment to "Let the librarian become aware of new possibilities." Although certain functions of the library are peculiar to that institution, in other ways, the library does not stand alone as an isolated adjunct of society.

No possibility must be overlooked, for the task of equipping our libraries to meet the increasingly exacting standards they uphold in the cultural environment of America cannot be underrated. The challenge is without end, and we must continue to look for new ideas and new leadership as we seek endlessly the means to make our libraries better.

EDNA VOIGT: The heavy oak furniture of forty years ago is the natural image which remains of the libraries of that period because it is what manufacturers illustrated in their publications as their standard line. But to round out the picture, there was a large amount of custom work produced which was not recorded in catalogs. I remember reproductions of lovely old English Tudor tables at Northwestern University. More often, equipment was especially designed to harmonize with the architecture of the building—such as the Duncan Phyfe for the D.A.R. in Washington, the Gothic for Fordham University, the Early American for the River Forest Library in Illinois, the Colonial for Avon, Connecticut, the Jacobean, Spanish, and Georgian. Considering the periods in which one could work, the past was almost less monotonous than some of the Contemporary work today. And one was less tempted to be sensational in order to be original.

The dollar has shrunk to the point where it would be impossible to duplicate the buildings of the past, and also much of the furniture. Where for instance, could one find skilled wood carvers today? We are lucky that greater attention to functional planning, new materials, and scientific advancement—such as in the field of air-conditioning—paves the way for new solutions. But paying attention to the past can provide us with a truer sense of values.

As new library buildings multiply, so it seems, does the tendency on the part of designers to strive for uniqueness in the appearance of the equipment. Eye appeal is paramount. Just as the attractive color of a bathroom or a kitchen may clinch the sale of a house while the quality of construction receives scant consideration, so may a reading table chair be selected with complete disregard for the comfort of the user. In some cases, the reader may just as well be seated on a backless stool.

Nevertheless, this urge on the part of interior designers is a spur to library furniture manufacturers. We too take pride in creativeness. New ideas are taking shape, such as an interchangeability program which will enable a plant to offer more designs without increasing manufacturing costs.

The two main scientific advancements which have contributed to the quality of wood equipment are electronic gluing and synthetic finishes.

Frequently we are asked for the comparative value of wood versus high pressure laminates for table or desk tops. The choice depends upon the qualities most important to you.

Formica, Textolite, Micarta, Parkwood, Consoweld, etc., are simply trade names of different manufacturers for their own products. All of them must meet the minimum specifications of NEMA, the National Electrical Manufacturers Association.

High pressure laminates are harder than wood and provide a miserable writing surface if one uses a single sheet rather than a pad. For reading tables, therefore, wood tops might be preferable. On the other hand, high pressure laminates might prove more satisfactory for circulation desks and catalog consultation tables where there is constant abrasion from books and trays.

Neither high pressure laminates nor wood are indestructible. All one need do is observe the high pressure laminate counter tops in coffee shops. Many times you will find nicks and wearing off of patterns.

High pressure laminates cannot be repaired as easily as wood. True, repair kits are now available, but manufacturers admit that these are not very helpful when used on plain colors.

Because of the hardness of high pressure laminates, binding the edges of table tops with them is questionable. It may result in damage to the chairs. In one library where a great deal of thought was given to this, Formica was used on the edges, but the edges of the tables were sloped at the same angle as the back posts of the chairs. Thus a chair might hit a flat surface, but not an edge. Even this, in addition to being far more troublesome to do because presses could not handle a slope, was not entirely foolproof. The best bet seems to be a wood edge on table tops.

For those who love wood, the real thing has a beauty that cannot be imitated. Thus, are there places where high pressure laminates might be preferable? Yes—you might, for example, wish to introduce some color in a children's room. Then too, high pressure laminates are quite practical on occasional or coffee tables. Be prepared for extra housekeeping, however, if white tops are used on reading tables.

The use of lounge furniture or upholstered reading table chairs entails the choice of a covering. Leathers and plastics are used more commonly than fabrics, although the latter can be effective. Many people already have their minds made up in favor of one or the other of these materials. If you are among them, there is no reason why you should not have what you want. If you are undecided, here are a few points to consider with respect to leather and plastic:

1. Pricing. Comparative pricing might vary between different manufacturers. This is why: Plastics are purchased by the yard, and may be ordered in the exact quantity needed. There is no waste. Leather, on the other hand, is bought by the hide. If leather is required for only a few pieces, there is wastage. Supply houses that do not stock leather would have no further use for the left-overs; the entire hide must be added to the price. On the other hand, houses that *do* stock leather expect more orders for the same thing. There is no wastage. What is left from a hide goes back into stock. Therefore, the price differential (between leather and plastic) is smaller when quoted by houses that stock leathers, but the cost will be somewhat higher than that for plastic.
2. Durability. On this point, some people's minds are already made up, perhaps, because of personal experience, or because they have been convinced by a highly geared sales promotion program. Materials purchased during World War II may have suffered in quality because manufacturers or tanners could not secure the proper chemicals.

   When I explored the subject some time ago, I learned that the Bureau of Standards in Washington had not made any tests to compare the strength of leather and plastics. The only impartial laboratory test of which I have knowledge is one reported by the Leather Upholstery Group. This report which came from the U.S. Testing Laboratory rated leather as 77 percent stronger in general; 151 percent stronger along seams; and 37 percent better at holding its shape. What about cracking? This was a problem some years ago when leather was finished almost entirely in nitrocellulose. Competition from plastic manufacturers spurred the leather industry to further research. The newer resinous finish keeps leather soft and flexible. Leather may be cleaned with mild soap and water. I recently queried the U.S. Rubber Company about cleaning light color Naugahydes, and they recommended strong detergents. I have not had any personal experience regarding the effect of these.
3. Color. There is a wide selection in both plastic and leather.
4. Comfort. Both leather and plastics are hotter than fabrics. Personally, I would rate plastic—even the breatheable variety—as hotter than leather. Different people may be affected differently, and, of course, air-conditioning in buildings may make this factor less important.
5. Beauty. I doubt that there is any question about the superior elegance of leather, even among those who select plastic.

EDWARD G. STROMBERG: We have a Toy Department in Philadelphia in which we use scale-model furniture for library planning. The models are built at a half-inch to one-foot scale. The arrangement looks like a Lilliputian Library, and it never ceases to fascinate me. Many people say, "This is the way to do it," and whenever it is geographically possible, we invite the librarians to be the chief "toy pushers." None of them have ever left without the feeling that they have compressed weeks of work into a few hours. This service puts us in an excellent position to observe the trends, and to be part of the move towards new ideas, construction, materials, and if I may say so (hesitantly), design.

Mr. Van Buren claims that furniture needs to be completely redesigned. It seems as though we ought to start with people.

I saw a house at Disneyland, the whole of which has been molded in fiberglass. The furniture came out in lumps from the floor. The television set was molded in the wall. It wasn't very flexible, but when you bought the house you had everything.

So, design trends begin as conversational pieces and then become controversial. The "Dean of Librarians," as many call him, and I'm sure you know who he is, lectured me roundly and soundly in Montreal about the "infernal triangle." His reference was to a triangular table which we had designed for an exhibit—as a gimmick—to have the librarians do a "double take" as they walked by and ask, "What is it?" The "gimmick" turned out to be so successful that it became a regular item. I don't know how Mr. Van Buren regards the triangular table, but we've made hundreds of them since.

Miss Voigt covered the plastic laminates pretty well. I think I can skip that subject. However, I have seen chair backs gouged badly by sharp edging. Let us consider the question of various types of wood. The lectern at which I'm standing is done very well. It has a veneered top with an exposed band protecting the top veneer which, at the most, could be a sixteenth of an inch thick.

If this top veneer continued to the edge and had been rounded to even an eighth-of-an-inch radius, then there would be a feather edge on the veneer. This would be the first point of wear and chipping.

Some of our competitors use birch and some maple as we do. We also like walnut, in its proper place. In finishing, some use lacquer; others use catalytic varnish. Some manufacturers may even be considering one of the new polyesters, which is a process of creating a plastic laminate directly on the table top.

Earlier, Mr. Poole and I discussed the trend toward oiled walnut. He asked the blunt question, "Do you approve of this?" I do. For years, I have used it in my living room. Then the question, "What about the low light reflectance value of the top, a value which lighting engineers seem to consider too low?" Our answer is to use a neutral beige vinyl reading area with oiled walnut end banding that blends well with any color you put in the library.

Observe the table in our exhibit that Miss Voigt refers to as our "Wrap-around" table. I will admit that you can't smoke at this table without an ashtray and you can't polish your fingernails without being careful. It makes a beautiful, resilient, writing surface. It not only protects its own edges but also protects the chairs. It is not an exclusive item with the Sjostrom Company.

There has been little mention of the cores of veneer and plastic surfaced table tops.

The producers of one of the plastic laminates is making a high-density chip board. This does not reduce the weight—the shipping weight—particularly; however, it does reduce the cost somewhat. With this board we are using a new fastener, whose name I will not mention. However, it held the fire wall on the space capsule in which Carpenter went up, and if it will hold that, it will hold a leg on any table.

This brings us to the question of legs on the table. The current era in library furniture is known as the "metal cycle." The reason for this "metal cycle" is a step towards the ultimate; that is to maintain a reading top at a 28- or 29-inch altitude with no visible support. We are diligently searching for a Persian to design a table on the same principle as his mythical flying carpet.

To reverse the flight from fancy to metallurgy, numerous metal supports are available. There is plain steel, welded, with a baked enamel finish. There is aluminum with anodized or clear epoxy finish. And then there is stainless steel which needs no finish.

A librarian visited the plant not long ago who didn't like our tables or some of our competitors' tables because the fastenings between the legs and the stretchers were exposed. Now, an Allenhead bolt is about the most unobtrusive fastener you can use. You can countersink it level with the surface and make the base demountable.

Welded construction is fine and the points in its favor are that it is strong and there are no visible fasteners. The bad part is that it is space-consuming and damage-prone on a long-range shipment. You can ship only about eight tables in a van where normally you might get thirty-six. On the other hand, the demountable type, which most of the manufacturers are using, is more flexible and less costly because it can be mass-produced as a parts program—something I think Miss Voigt was alluding to when she said some sort of "standardization."

The advantages of demountable tables are quite apparent: you can ship them easily 12,500 miles in any direction. That is half way around the world, isn't it?

We move to circulation, charging desks, or reference desks, or whatever the specific area requires they be called. There is some controversy as to whether 26 or 36 inches should be the standard width of the sectional unit. In a small library that requires numerous services within the desk, a 26-unit provides the maximum service in a smaller area. The 36-inch unit provides the maximum work top at the least cost in a larger area. Most manufacturers will make both. The top width seems to generate a little less controversy. A top width of 27 inches seems to be an excellent average. Of course, material for the top is a matter of customer choice. There is linoleum, the old stand-by; there are veneers, the plastic laminates, the flexible vinyl sheet, and, of course, marble, if you can afford it.

Now, why go to marble or something like that for a charging desk? Because, in most universities and high schools—even in the public libraries—you have to "rebuff the buckle brigade." Some manufacturers have come up with the idea of a *buffer bar.*

I would suggest that the material used for this buffer bar be a different material from that used for the top of the desk. The buffer bar is there to protect the top; it must be replaced eventually and, if it is of a different material, the replacement will not be so apparent.

Speaking of individualizing circulation desks, I would say that the architect could have his choice of anything from exotic woods to a millwork match. The new design of the charging desk by most manufacturers is more or less a shell design with a surface insert. The sectional unit has a leg or a closed base, as you prefer. With some of the desks, you can change your mind about what kind of base you want up until the time of installation. Even when you reposition a desk, you can change from a closed leg base or vice versa.

A desk manufactured with the accurate machining that can only be accomplished with the new woodworking machines is a far more flexible desk in its sectional unit, and it serves its purpose much more adequately than the immovable, unexpandable, millwork monument.

To cover the last item (and no doubt you will have more)—the card catalog: There seems to be a trend away from the "high-rise" card catalog toward the "ranch style." The newer style makes for better distribution of traffic, better visual control, and the elimination of the reference table.

What we are suggesting now is to use the top of a low-silhouette card catalog unit. You not only save money, but it is esthetically more interesting.

QUESTION: Assuming that you have a specific amount of money, I would like to ask the entire panel, which would they choose: custom-built furniture or standard furniture? I am speaking in terms of the small library which is being furnished for many years to come. Should they go for fewer items at greater cost or try to furnish the library with as much as they can for less money.

MR. VAN BUREN: I tried to make one point clear, but perhaps I didn't. I would say to a librarian who is selecting furniture and who does not have a professional designer or consultant—and by that, I include professional engineers who represent manufacturers as well—stay away from special designs. Stay on safe ground and do your purchasing from standard library catalogs. You are buying certain pieces of equipment that are going to be there for ten or twenty years. Stick to the tested products.

It may not be, as I said, a "design of tomorrow," but it would be a safe design and it would be a safe way of spending the money. If you have sufficient budget to afford professional consults, designers, or experienced people, then, all right; perhaps you could experiment with custom designs. We have actually, in many jobs, saved clients a good deal of money by using certain tricks of special design, but that takes a lot of know-how and a lot of experience.

I also happen to know that, in certain instances, accomplished engineers, who work for manufacturers, can show you short cuts, but this is true only if you rely on experienced engineers.

MISS VOIGT: I agree with Mr. Van Buren that you should, by all means, stick with established, standard items, but I would suggest that you also consult manufacturers, because they may be able to do something a little different for you with standard parts, something that may not affect your cost too much. But if you are going into a small amount of furniture of special design, I think you would sacrifice some of the quality that you get from mass production, where manufacturers can afford the machinery for precision work.

MR. STROMBERG: At the risk of being prejudiced, I say please stick to the catalog. However, as Miss Voigt mentioned, the parts program has been developed among most of the manufacturers for that very reason—to give you exactly what you want at the minimum cost.

MR. VAN BUREN: May I make a final comment? I could use as an illustration one library that we did in Gaston County, North Carolina, whose budget was roughly about 50 percent of what we considered the minimum. It was a model project, and by using certain tricks, we saved them what was later estimated by a library equipment manufacturer about $1,200 on the lending desk alone, by adapting certain things and using certain custom-made items. But, again, I say it must be done by someone who knows these tricks of the trade.

QUESTION: I have observed the trend, which seems to be fairly popular, of going to the dark furniture. I would like members of the panel to comment upon the appearance and durability of the dark furniture.

MR. POOLE: The gentleman asks for the panel's comments on the attractiveness and durability of dark furniture. If I may, let me add a question of my own that relates to this: For many years, librarians have been concerned with the proper reflectance of table tops, because they are conscious of the fact that it is difficult for the eyes to adjust quickly when they look from a very dark surface or, at the other end of the spectrum, from a highly reflective surface, to a sheet of paper. The Society of Illuminating Engineers has established a standard which indicates that a reflectance of between 35 and 50 percent of the light falling on that surface is considered optimum. For the past few years, our medium color finishes in furniture have been within this range. Now, we come to an apparent trend or fad in which we are accepting the very dark, oiled walnut finishes. I understand that these finishes have a reflectance value of about 15 percent, that is, 20 percent below the accepted standard of 35 percent. In commenting on the question about dark furniture, I hope our panel will also comment on this shift away from the standard for light reflectance on the surfaces of library table tops.

Mr. Van Buren, would you like to start on this?

MR. VAN BUREN: First, in my own opinion, as an individual consultant, I do not believe in exploring these problems (even with certain statistical facts about reflectance values) without consultation with all of the architects and engineers involved in a project, and I want to say that that is most important. I think every building has its own particular problems. One factor is the building's light values, which relate, of course, to ceiling heights and other things. (I think there are problems other than those immediately connected with light conditions that the lighting engineers and architects have considered.) The time interval that the people are going to be using the reading surface is a factor—that is, whether it is going to be a very brief period of time or not. And so the first point as I said, is, that I do not consider, as a consultant, that I am a consultant standing by himself. I repeat what I have said—what Hoyt Galvin and I have written—that the success of any library depends upon the cooperative action of a planning team, and that means everybody: lighting engineers, architects, the whole group.

My second general thought is that there is a valid point to be made about using very dark surfaces for reading on white paper where there is strong contrast. In many of our own libraries, we try to use the darker, richer woods in surfaces, not necessarily only for reading tables. We might make a card catalog cabinet of a rich wood. We might work with the architect in trying to install some paneling in dark surfaces. Very often, we will contrast light and dark woods. Although there are some exceptions, in the great majority of cases, you can have your writing surfaces light and still use your dark luxurious woods. We are doing some libraries now in which we have used the walnut bases and legs with light surface tops, perhaps a light gray Formica, or a similar surface. I am not here to quibble about particular surfaces. I can say that you can still have light writing surfaces and you can still introduce the richness of your woods.

Illustrations can be taken from this very room, where you have some very nice, rich, wood paneling, which gives you the over-all effect of wood, and the softness of woods, too. If this were a room with reading tables, you might have the reading tables either a light wood or a light color; so you see, there are a lot of possibilities. However, I want to go back to that one basic point and that is the importance of the cooperation of the planning team, every single member.

MISS VOIGT: I believe that finishes on dark wood wear equally well as those on light woods. Some years ago, these suggestions of the illuminating engineers were taken very seriously, and we have one period where libraries were quite pastel. The furniture was light, the floors were light, the walls were light colored, and they were just plain anemic. I spoke then to somebody at the Eye Institute in New York, and they offered the suggestion that people's eyes vary just the same as people do; that some people require more light than other people. Therefore, I think that if you use the recommendation of these lighting engineers and temper it with common sense and experience, you will get more interesting interiors.

As Mr. Van Buren said, you can be particular about your reading table tops. Perhaps you ought also to consider the floor, especially where it reflects light on the lower titles of book shelves, but, certainly, elsewhere around the room. In the lounge furniture there is a wonderful opportunity to introduce contrast.

MR. POOLE: Mr. Stromberg has already spoken to this point. I wonder if he would like to make a further comment.

MR. STROMBERG: Just one short one. The gentleman asked whether the dark finishes on the light wood hold up. Well, if you use a penetrating oil stain initially, and a good catalytic varnish on top of it, they will work out fine. However, if you use walnut to start with and you oil it—even with the blue-jean set—there isn't a nick or scratch on those chairs after five years of use.

COMMENT FROM THE FLOOR: I am not an expert or a specialist, but I would like to say that we have been aware of this problem for some three or four years; we have tables in the old portion of our library which are a light color and a light surface. The students complain about the glare on those tables. I had the paint foreman for the university go over and look at them. He told me we had a hard varnish on there and it naturally reflected light, but it would wear so much longer. I said, "Can you take it off and put on a dull finish that will absorb and not reflect?" And he said, "Yes, but we will have to do it about every six months."

I said, "Fine. Go ahead and do it." And I had that problem in mind when we started with the furniture. We have discussed it as we went along, and the table tops are not yet what we want. There is a reflectance factor of about 49 percent on this surface. We have worked with the manufacturers on it. They have approached the maker of the plastic laminates, one of which has been used on these tables, and we feel that we have the solution to it. I can say that some treatment and rubbing of those tables is required to bring the surface down to a lower reflectance rate.

COMMENT FROM THE FLOOR: This question was considered in planning this particular building. As you know, this building is still under construction. The men are working outside tonight on the lights, on the outside portion of the building, as you can see. There are many things inside the building too, that are still being worked on, as you can also see when you go through it, but the problem of furniture surface reflectance was one which we discussed no more than ten days ago with the manufacturer.

They said they would have the factory personnel down here, would have the job done in four and a half days for us. I told them that that was too tight a schedule, and to let everyone of you look at it and see the various pieces of furniture as they are, because I like them, and afterwards we will do what is necessary to reduce whatever reflectance factor we have, if it should be desirable.

MR. POOLE: I raised the point, not because of the dark tables which have been used here, but because this is a question which has been asked of the Library Technology Project several times during the last few months. Just two weeks ago we had a letter from a purchasing agent in New England who said there were a number of libraries who were considering this question and they wanted some answer. The real question was: Is the trend one which is being pushed by designers or by manufacturers and are the standards of the Illuminating Engineers Society being ignored. This seemed an opportunity to get some comments from the people on tonight's panel who should know about this problem of reflectance. Some very interesting points have been brought out in this discussion. I don't know that the question is fully answered, but I think we do have more information on the matter than most of us had at the beginning.

QUESTION: This will probably be directed to you, Mr. Poole, as much as to anyone else. It deals with the principle of function. So much has been done and written in the field of work simplification, and this appears to be the important part. In library furniture for example, circulation desks have been designed that have special storage compartments to take care of some of the clutter which automatically appears on top of such desks. In addition, one of our equipment manufacturers recently has gone into the development of workroom furniture. I should like to ask whether, in the future, the major manufacturers plan to go more into the functional aspects of design, aside from that which has been done so well on the circulation desk? Or, because of the vast difference in methods and procedure, is this primarily a responsibility of the individual library?

MR. POOLE: Summing this up: The question asks whether library furniture can be designed so that it is functional and whether the manufacturers are giving more thought to this aspect of furniture design. I think the question is directed primarily to the manufacturers' representatives and to our independent designer. Is there a trend, or is it expected that in the future more attention will be paid to designing tables and desks so that they are more functional?

MR. STROMBERG: I believe that the question was directed toward workroom furniture more than toward reading area furniture. I happen to know the manufacturer of whom he is speaking who is making this very inexpensive shelving, and so forth, for the workroom. I speak for myself and my company, particularly. At this point, we can't exactly compete with the manufacturer on those ideas. I have often wandered in as a lone figure in library workrooms, and I want to tell you that the furnishings and equipment are just as different as women's hats. The thing defies me. Maybe Miss Voigt or Mr. Van Buren has an answer.

MR. VAN BUREN: Well, I made certain criticisms this evening about the progress that has been made in the last sixty years and I made a very extensive search through library channels and library equipment catalogs as far back as 1901. For roughly the last eight months, on my own, I have been devoting a lot of time to the study of the function of some of these pieces of library equipment, such as the lending desk. I have developed some ideas which I think are only a beginning. I don't know where I am going to go. I am not a manufacturer. I have had patent searches made in Washington, and the result is that these simple little things that I have worked out are, according to the patent attorneys, not patentable on design but rather on utility on three counts. Furthermore, I have no shop. I am only one person investigating ideas and I wonder, seriously, what the regular manufacturers—with full staffs and full shop utilities and development facilities and finances to go into these things—have done. Consider one person sitting in a drafting room developing patentable ideas—and I have actually designed some of these ideas in one form or another in certain libraries. They have met with such popularity that librarians even from other countries have come in and wanted to utilize some of these little tricks. It is not that they represent anything great or revolutionary, as an over-all concept; my point is that I think the potential is tremendous. For example, I think one of the poorest solutions of the problem of library equipment in the library field today is that of the lending desk. I think it is ridiculous. It is inflexible; it is nothing but a bunch of boxes, and you can pick it apart. You pull out one section and it will do something else. I don't think that is enough. My premise is that we should look into other fields, fields that we have a little something to do with occasionally—such as hospitals—and the tremendous strides that have been made in these other fields. I go into a hospital today, and I am astounded at the special hospital equipment that has been developed by the hospital equipment people. I think a great deal has been done in steel book stacks. I think a great deal has been done in various sorts of filing systems and that sort of thing, but I think that in a great many areas of library furniture design, we haven't even scratched the surface.

I recall the Princeton Committee back in 1945, which said that within five years we wouldn't even recognize the equipment that libraries would have; they called it "resources." Well, 1945 is a good many years ago, and virtually nothing has been done in certain areas of library equipment. I think it is time for a renaissance in thinking about library equipment, and I think it is time that the library equipment manufacturers begin to wake up and really do something in certain areas. That is my feeling.

MR. POOLE: Miss Voigt, would you like to comment?

MISS VOIGT: Of course, library manufacturers are interested in function, and I think most specialists would be very happy to sit down with you and observe your particular way of doing things. Then, if it is found that your way of doing a certain thing is the same as that for many other libraries all over the country, then it would be something worth standardizing. You would have to be more specific, of course, in your complaints. Just to say that something is not functional isn't quite enough. Just what are you trying to accomplish? What does the furniture that you are now using fail to do for you? Most equipment, I think is planned quite specifically for new buildings.

QUESTION: Before you close the discussion on that subject—I was under the impression that the question was directed to you (Mr. Poole) and what LTP has done recently. You have visited almost all of the manufacturers. In their showrooms and in a great many libraries, you have seen things like the microfilm reading desk, such as the Pope Pius Library had, and I would like to hear your comments.

MR. POOLE: The question is—knowing that the Library Technology Project has watched new library construction, that members of our staff have visited the plants of several of the manufacturers, and that we have seen new library equipment in many places—what do I think about the problem of functional design in furniture.

Yes, we have visited a number of manufacturing plants, we have seen a number of new libraries, and we have seen some things here and there, which seem to represent new and interesting developments.

However, the Library Technology Project itself has done nothing yet in the way of work simplification, although this is an area to which we hope to turn our attention later. We have done nothing with the design of workroom equipment. It seems to me that, in their workrooms, most libraries carry on sufficiently different functions or carry on the same functions in sufficiently different ways that is difficult to standardize on equipment. This is something the librarian in his own situation must work out with his architect or designer. I recall that one time, in a library with which I was associated, we sat down to work out a special desk for marking books, and we finally ended up with a piece of equipment which cost over a thousand dollars. This was a desk designed especially for a right-handed marker. Not long after we had to turn away a left-handed marker because the desk wasn't very functional in that respect. Of course, we knew this to begin with, but we were counting on the fact that most people are right-handed and for such people this was a very functional desk. This worked out for us, but it might not have worked for very many other libraries. My point is that in many cases you must take into account the peculiarities of your situation. In others, some degree of functional standardization may be entirely feasible.

As Miss Voigt said, I think most manufacturers, planners, and architects would be happy to sit down with the librarian concerned and work out special equipment which would be completely functional for that particular situation.

The Pius XII Library was mentioned. I do remember one table in that library as a particularly functional piece of equipment. This was a table which was designed for use with the library's Recordak MPC microfilm readers. The table had a horseshoe-shaped opening in which the researcher could sit. It was conveniently located so that he could handle the controls of the machine easily; it also had space in front of him for writing and space at the side for a typewriter. This was a very functional piece of equipment, designed especially for that library, but it could be used with similar microfilm readers anywhere. This is the sort of thing that the librarian works out to meet his own needs, and I think it would have to be handled on an individual basis in most cases. This is not, I believe, a mass production item, but it could certainly be made for anyone who wanted it.

QUESTION: I would like to hear Miss Voigt continue her discussion on library furniture finishes.

MISS VOIGT: I mentioned three finishes: lacquer, oil finishes, and conversion varnish. We used lacquer some years ago and we ran into problems. We found that if a pen pricked the top of a table, moisture could get underneath and mar the finish. We also found that the color of finishes changed. They yellowed rather quickly with lacquer. Oil finishes are very popular today. They are beautiful, but I think you must decide for yourself whether you can afford the maintenance. Mr. Stromberg mentioned earlier that one company sends out a notice with their shipments when the furniture is made with oil finish. After the first year, the pieces had been re-oiled four times. Now, if you are using this type of finish throughout a large building, have you the staff to handle that much maintenance? After the first year, the furniture requires maintenance at least twice a year; if you don't maintain it, the finish will deteriorate.

The conversion varnish finish—the one which we use and which we are very proud of—is a baked-on finish. We have found that it stands abrasion very well. It is stain resistant and even a cigarette, which has been lying on the surface for a while, will not do it much harm. I think the thing to do, if you are undecided, is to obtain samples of varnish finishes and really put them through the test yourself.

MR. POOLE: Mr. Van Buren would like to add a comment.

MR. VAN BUREN: We ran some tests on linseed oil finishes with walnut surfaces. These are conditioning finishes used in the Scandinavian countries; they have been for a hundred or two hundred years. We decided that we would pour on some materials such as nail polish, paint, ink, coca cola, whiskey, and a few other things. We found that steel wool and linseed oil will take those stains out. One advantage of a linseed oil finish is that it is a penetrating finish and not a surface-coated finish. This means that if you do have a burn or a stain, you can take it out without refinishing the entire surface. In contrast, if you scratch or mar a straight lacquer finish—which is a coated finish—you must refinish the whole thing; you can't patch it.

Now, the conversion varnishes—which are very popular, so far as I know—are probably the most durable of the applied finishes. I don't know how they compare with Formica. Goodyear (or Goodrich; I'm not sure which, at the moment) has developed a new finish now being used by U.S. Plywood that has even greater abrasive resistance than Formica and the plastic laminates. However, there is one difficulty: like the plastic laminates, it has to be applied at the factory, and, in addition, it must be applied only to flat surfaces. You can't, for example, put this finish on the curved arm of a chair. What possibilities that finish may have remain to be seen.

In any event, we have had this experience with penetrating oil finishes. There were some linseed oil finishes on walnut tables introduced into the Charlotte library about six years ago. Unless I am mistaken, those surfaces are treated once a year. I have had some recent pieces, chairs in our own office, that have been in constant use since 1953 or 1954—which is eight years. In those eight years, we have applied linseed oil only once. The finish, I want you to know, is as beautiful as the day the chairs came in; they happen to be arm chairs. Ordinarily, the arm of a chair wears at the point where the person's hand rests on the front part. In the case of these chairs, the oil from the hand appears to enhance the finish. In short, our experience has been that we oiled the chairs only once in eight years; we have had no deterioration at all.

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Book Stack Selection for the Library

During the afternoon program on Friday, June 15, Keyes Metcalf, library consultant, Cambridge, Massachusetts, presented a paper on the selection of book stacks for the library. Mr. Metcalf was introduced by Frazer G. Poole who also served as moderator for a question-and-answer discussion following Mr. Metcalf's talk.

KEYES METCALF: I am scheduled to talk for a full hour on book stack selection for the library. That may sound something like a doctoral dissertation where the author is trying to show that he knows more and more about less and less. But I can assure you that this is not a doctoral dissertation. There is nothing original in it. It will reach few definite conclusions. I am going to outline book stack problems and then tell you that it is up to you to make your own selection after understanding what the problems are. I shall interpret the subject broadly and talk about the equipment and also about its arrangement.

I shall talk from the standpoint of a librarian, not of a stack salesman. I have nothing against the salesmen. I have good friends among them. But I have nothing to sell. I want to help librarians to obtain what they need. I am interested in costs and saving money for the purchase of books, instead of using it for their housing, but I realize that there are times when money spent for good housing that will attract readers will be worth more in the long run than funds spent in any other way. You must remember as I talk that I have been in college and university rather than in public library work.

I shall use too many figures but can find no way to avoid them.

The problem of shelving is an important one. I have worked in recent years on quite a number of libraries that expect to have several million volumes in their collections. If we take twenty to thirty cents a volume as a rough figure for the cost of shelving alone, you can see that we are dealing with big money just for the equipment, without including the cost of the space the shelving occupies. The space itself, with its walls, floors, ceilings, lighting, and ventilation, costs several times as much as the shelving. If you are trying to save money, you should realize that if you can save even 5 percent in square footage used and equipment cost, without harming the results, it should be worth considerable time and thought.

There are a good many different problems. The first one has to do with the material of which the equipment is made. Today it is likely to be wood or steel. In the old days, many of our shelves were wood, attached to cast iron uprights. Today we use very little wood, except in reading areas and reading rooms where we have a feeling that wood is more decorative, warmer, and pleasanter to the touch and sight. You might say that wood is more flexible because it can be custom built to your own design more easily than steel. This being the case, wood can be fitted under reading room windows, for instance. I should go on and say that shelving doesn't belong there. Outside wall space is altogether too valuable to use for the accommodation of books, particularly if the wall is largely made up of windows, so that the total book capacity obtained will be small. In fact, book shelving, in my opinion, does not belong on a reading room wall in spite of the fact that books may be decorative. They are bound to give the whole room a feeling of restlessness because of people going back and forth to get the books, and the noise they make close to the persons trying to read.

Wooden shelves, particularly if they are walnut or oak, or painted—a Williamsburg blue, for example, can be very handsome—are likely to cost at least 50 percent more than steel shelving and perhaps twice as much. This is not true, of course, in underdeveloped countries where steel shelving must be imported and labor costs for the construction of wooden shelves are low.

It should be noted that it is possible under some circumstances to use cheap lumber and fabricate it very inexpensively in this country. This was done in the New England Deposit Library in 1941 and '42, just as the war started, and the Government three times took over the steel shelving that was made for that library. In order to get any shelving at all we had to go to wood. We tooled up for this shelving with gang punches that drove all the holes in an upright with one blow and made adjustable shelves possible. This shelving cost only half what steel would have cost at that time. It was dipped in a fireproof paint and is still standing quite satisfactorily, although I confess we would have preferred steel if it could have been obtained. Another problem with wood is that if the shelf length is too long, it warps, as the shelving in my office in the Widener Library did many years ago with unpleasant results.

But we are not likely today to build a concentrated book stack of wood. It's pretty sure to be of steel, which in general is cheaper and stronger. Steel can be fabricated more easily on a production line. However, wood can be used for finished end panels, to give a warmer, pleasanter, more decorative effect in a stack reading area. To use them all the way through a book stack is expensive, but not unusual. Some of us hope that, before too long, plastic or glass shelving, which will be strong enough and perhaps lighter than steel can be devised.

Let us now go on to a second problem—the type of construction. To oversimplify, book stacks can be multi-tier or free-standing, although it's not quite as simple as that. Most of us—certainly those of us that are beyond middle age—are acquainted with multi-tier book stacks, which hold themselves up. The first-level stack holds up the floors above, and sometimes even a reading room on the top floor of the building, as is the case in the New York Public Library.

A multi-tier stack provided as concentrated shelving space as could be found until we began to use one or another of the recently developed compact shelving arrangements. The uprights at the end of each section were the supporting columns for the whole structure. These uprights were at one time made of cast iron. Now they are steel. We shall deal with the length of sections later on in detail but, in general, shelving is three feet long, so the uprights come every three feet in one direction, and something like half as far again (or four and a half feet) in the other direction.

The stack companies making multi-tier stacks sometimes make them with the ceiling support coming from uprights which are nine feet apart in each direction, giving flexibility for the three sections and the two ranges between the uprights. A multi-tier stack has a good many advantages. The uprights, being placed fairly close together, can be small and don't get in the way as columns that support the whole building do. Coming close together, the floors can be thin, often no more than two, three, or four inches thick. But multi-tier stacks have disadvantages. When they are installed they are set. You can pull the shelves out, but there are the uprights, three feet apart in one direction, and up to four and a half feet in the other. They cannot be shifted. I should go on to say that it is amazing what you can do in a multi-tier book stack by removing the shelving. During the war the sub-sub-basement in the Littauer Center Library at Harvard, which was part of a multi-tier book stack, was used as a radar teaching laboratory, and thousands of men got their training in that field there.

Multi-tier stacks have other problems. If you want wider shelves, the only way you can use them is by narrowing the aisles between the ranges, although, theoretically, the deeper the shelf, the wider the aisle should be. In earlier days, multi-tier book stacks were made with ventilation slots between each floor level. We didn't have forced ventilation or air conditioning, but we realized that books did not do well in stagnant air. These slots presented a serious fire hazard. The book stacks in the original Library of Congress building, the New York Public Library, and the Widener Library at Harvard all have hazardous conditions because of these slots. Another problem comes from the fact that the lights are fixed. There is no harm in this if you can't move the book stacks, but it is just one more aspect of the inflexibility.

A combination of multi-tier and free-standing stacks can be arranged with the use of what is known as the Robertson floor. This plan was adopted in the Lamont Library where every other level has a floor strong enough so that the shelving on it can support the floor above it. Then what amounts to a multi-tier stack on one level holds up a free-standing stack on the one above, giving flexibility in at least half of the installations. Multi-tier stacks built today do not have ventilation slots. Stairwells and elevator shafts are closed in, and structurally, they present little more of a fire hazard than other parts of a library building. It is generally admitted that the cost of a multi-tier stack is less per volume housed than a free-standing stack, other things being equal.

The second type of stack installation is that known as free-standing. I must hedge on this point immediately, however, by saying that many stacks which librarians think of as free-standing are not so regarded by the manufacturers. Manufacturers take the attitude that a stack is not free-standing if it has to be fastened to the floor, and they also believe that if it is *not* to be fastened to the floor and is to be free-standing, it must have an extra-wide base in order to give it stability. Remember, therefore, when you talk with stack manufacturers, that for them a free-standing stack has a broad base with narrower shelves above. They may also insist, with good reason, on special reinforcements (of which we shall speak later) to provide additional stability. They tend to recommend a free-standing stack of this kind as more flexible, more easily moved, and more satisfactory than a stack fastened to the floor. I am inclined to disagree with them on this point. Almost any book stack, whether it is fastened to the floor or not, will damage any flooring beneath it, if it is cork, rubber, or vinyl tile, vinyl asbestos, asphalt tile, or linoleum. If you move the stack at a later time, you will find, generally if not always, that the flooring will have to be replaced or at least patched. Some recently developed stacks are said to refute this statement. I hope the manufacturer is right. If the flooring has been installed around the stack and not under it, you are no better off when you move. The cost of fastening the stacks to the floor is very small, and fastening them provides considerable, although not complete, stability. I am as yet unwilling to recommend any book stacks that are not fastened to the floor, even with a broad base. Without the fastening, they can tip over, and in too many cases have done so, sometimes with one range falling against another and the whole group going down like a house of cards.

This brings us to the question of stack stability. There are several methods of making the stack more stable beyond fastening it to the floor. One is known as sway bracing. I am sure you have all seen sway bracing with its heavy cross wires forming an X in between the two sides of a double-faced section of shelving. The arrangement is not handsome, and a book pushed back on a shelf will run into the wire; thus use cannot be made of the space between the shelves on one side of the range and those on the other. Getting ahead of myself for a minute, remember that most bracket shelves in double-faced cases, which make up most stack shelving, has two inches between the back of the shelf on one side and that on the other side, so that with a shelf seven inches deep on each side, it is possible to house a book nine inches deep placed anywhere (except where there is a similarly deep book on the other side) if there is no sway bracing in the way. The studies which have been made indicate that only 6 percent of the volumes in a college or university library are as much as nine inches deep. Of course, sway braces are not used for every section, but the manufacturers tell us that there should be at least one in every five, and preferably a larger percentage than that, and how are you going to be sure that the unusually deep books you have will not be shelved in the sections where there is the sway bracing? Sway bracing, of course, costs something to install, although it may be the cheapest of the methods of providing extra stability. I might go on and say that it has not been unknown for sway bracing to get out of order, although this is probably a fault of the person installing it, rather than the one who fabricates it.

A second method of making shelving more stable is to give it a wider base. This base may be made with a "button spreader." Some of the manufacturers like to have the base twenty-four inches wide, even if the shelving above is only sixteen inches from one side of the range to the other. Of course, this gives extra stability and is expensive. It can be provided with a flat piece of steel at the bottom fastened to the floor at the end of each section without the use of a closed base.

A third method is the welding of the corners of each section. This is fairly expensive, but it provides practically the same strength as the sway bracing, and the extra cost is far less than the value of the space saved by using a narrower base.

Another method used by at least one manufacturer is "brace built" construction, in which, every so often, there is a channel along the base of two sections. This holds the uprights in such a way that they cannot swing back and forth in the line of the ranges.

The next method is that provided by a finished base; that is, an enclosed bottom shelf, the top of which is three or four inches above the floor. This, of course, provides bracing for its full length and width. It also gives a more finished appearance. Because it closes the base, dust and dirt cannot get under it. Those of us who have worked with the bottom shelf three inches above the floor know how difficult it is to clean under the shelving, although it can be done with a proper attachment on a vacuum cleaner. A closed base is, of course, expensive.

A finished or a canopy top provides extra stability at the top and, combined with a finished base, might be said to make it practically impossible for anything to happen to the stack, except, under great pressure, to tip over sideways.

Still further strengthening is provided by finished end panels. The end panels, like the finished bases and the canopy top, result in what seems to be a more finished job. They are often considered essential, particularly in reading areas, although I have known of more than one librarian who likes the look of the book stacks without the finished end panels, because more of the books can be seen, and books are attractive. The cost of end panels is considerable.

Other methods of strengthening include using steel channels at the top between the uprights and running supports from the top of one range to the adjacent range. The latter are called "strut channels." They may not look very well but, if the bracing from one range to another is placed anywhere except immediately adjacent to the cross aisles, very few if any persons will notice it.

Many of us would say that it all comes down primarily to three points: safety, cost, and appearance. None of us wants the book stacks to tip over. I am unwilling to recommend any free-standing stacks that are not fastened to the floor because I want them to be absolutely safe. They must also be made stable enough so that they will not sway in any direction. A broad base will help, as will finished bases, finished ends, canopy tops, and all of the special devices that I have just discussed. They will all cost money, adding up sometimes to more than 25 percent of the basic installation.

I am not worried so much about the costs of these modifications if they are necessary and more attractive. However, I particularly object to the costs entailed in broadening the base and making the whole case twenty-four inches from front to back instead of sixteen or eighteen if it isn't necessary or if an equally good solution to the problem can be found for less money. The stack manufacturer may say the broader bottom shelf does not interfere with the reader or the library staff member as he goes up and down the stack aisles because it is at shoulder height that the width is necessary. I do not agree with this. I am no more interested in the width at shoulder height than that where the wheels of the book truck come. Any stack aisle that is thirty inches across is wide enough for a person to get through safely without bumping into the shelves at either side. We are none of us as broad as Carver Doone was supposed to be.

It's possible for most of us to squat down in a thirty-inch aisle. (More of this later.) The problem of the narrow aisle is that of two people passing, and this really is not nearly as serious as some of us have been led to believe but, again, I'll speak more of that later. Narrowing the ranges six inches from twenty-four to eighteen inches may increase capacity 12 percent without narrowing the aisles. If you are ready to settle for ranges which are only sixteen inches from front to back, the difference may be 17 percent. Of course, you must buy as many running feet of shelving with the shallower range; but the narrower ones cost some 10 percent less per running foot. Also, remember that the cost of the space that is occupied is the greatest expense, as I indicated earlier.

Another argument for the wide bottom shelf, which provides the extra stability, is that the larger books can be concentrated there, but, because the 6 or 3 percent respectively of all our books more than nine or ten inches deep are concentrated very largely in a comparatively few subjects, it doesn't help much. They can properly be segregated. It is better on the whole, less expensive, and as convenient to keep them together in one part of the stack where they can be readily found. In this connection, some of us have been bothered by the size of the card catalogs in book form produced by the G. K. Hall Company of Boston. They are certainly larger than any other considerable collection of books that most of us are acquiring at all regularly. They are just over ten inches deep, and if placed on an eight-inch shelf with two inches available at the rear before you come to the next shelf, they will not protrude into an aisle enough to do any harm. They fit very nicely on a shelf nine inches deep in actual measurement. And there are very few reference books any deeper except large atlases.

So much for multi-tier and free-standing shelving. Our next problem comes in the type of shelves that are attached to the uprights. There might be said to be three or four main types: commercial, slotted or standard, bracket, and cantilevered. We have all seen commercial shelving in storage warehouses and elsewhere, plain and unadorned, adjustable only through the use of bolts and nuts, and then with some difficulty. Partitions between sections are at least an inch wide so that little shelf space is lost, but the chief difficulties are the appearance and the lack of adjustability. I confess the best of them are not bad looking. They cost, however, perhaps no more than half as much as the other types of shelving, and certainly are not improper to use on occasion in warehouse storage or in basement stacks closed to the general public and where books are seldom moved.

Next we have the slotted or standard shelving. Here the shelf rests on four supports, two at the rear, two in the front or all along on slots at the ends of the section. This makes them a little more difficult to adjust, but in some ways offers a slightly better appearance. Many of us have been inclined to use the slotted-type shelving in our rare book rooms and in our reading rooms if we do not have wooden shelves there, but the percentage used in book stacks has been comparatively small in recent years. Slotted shelving is generally somewhat more expensive. It is probably more stable in one direction, if not both, and certainly does not require all the extra bracing of the kind that was discussed a few minutes ago. But because the weight is distributed and not concentrated in the center close to the center upright, the stack may be just as easy, or easier, to tip into the stack aisle unless fastened to the floor.

The third type is bracket shelving. It was first used early in the century. I remember the installation of the Oberlin College Library in 1908, which was the first that I had seen. The shelf is hung on the uprights. It is easy to adjust. It is possible, if you are strong and husky, to pick up a shelf loaded with books and shift it to another section. Steel book trucks have been made with end uprights so fixed that you can hang bracket shelves on them and move six shelves at a time from one section of a stack to another without handling a single book by itself. I must say that this is not easy to do. There are two varieties of bracket shelves. In one, the ends are hinged and can be folded over. These have the advantage of stacking when not in use, as the ends do not get in the way. With the other, the ends do not fold over. There is really very little choice between the two because, while the cost of the hinged brackets is a little higher, the installation charge is lower in approximately the same amount.

One final type of shelving is an arrangement of bracket shelves which is supported by a cantilever with a strong angle iron on the bottom of each end of the shelf. This is used primarily for newspaper and folio volumes, which should be placed on their sides. The average newspaper today is perhaps twenty-three inches high (or long) and to place the bound volume of the newspaper on its side, using a thirty-six inch section, is uneconomical. It is generally possible, if the cantilever shelves are used, to make room for at least four rows of newspaper volumes in three sections, thereby increasing capacity by a third. When these shelves were first installed, they sometimes were not strong enough and warped, but with heavier gauge steel, that seems no longer to be the case.

The problem as to whether to use bracket shelving or the slotted type depends upon what you think about the appearance and the costs. The latter is generally, but not always, somewhat more expensive. Bracket shelving is a bit more flexible, but there is comparatively little difference.

The next problem arises in connection with the shelves themselves. They come in two types—flat and bar. Bar shelving was used extensively in the past. It was supposed to be stronger, and the slots between the bars were supposed to provide for the ventilation that was desirable in humid climates. Today, bar shelves are not so well regarded because they tend to damage the bottoms of the books. If you examine a heavy volume that has rested on bar shelves for years, you will often see indentations on the bindings from the bars. With proper forced ventilation, the bars are not needed. Some people say that they have the advantages of letting the dust fall through, which raises the question, fall through to where? If you are going to have the dust settle, why not let it settle on a flat shelf where it will be easier to remove. In this connection, I should go back to the canopy top, which is supposed to keep the dust from settling on the top shelf. It is sometimes claimed that the movement of the air at the top of the book stack is such as to deposit an undue amount of dust on the top shelf. I am not convinced we need to worry about that; certainly not if the air is filtered in connection with air conditioning.

But there are other problems about shelves. The bar shelves are said to be stronger because of the bends in the steel, which give additional strength without additional weight, just as a corrugated concrete ceiling does. The point is that we must be sure that the gauge of the steel in *any* shelf is heavy enough so that the shelf will not warp. In general, there is very little trouble with steel shelves warping so long as they are not more than thirty-six inches in length, and this brings us to the question of proper length of shelving.

In the United States, we have practically standardized on thirty-six-inch sections. That is the gross, not net length. The net is somewhere between 34 and $35\frac{1}{2}$ inches, according to the type of shelving and the way the uprights are fabricated. In countries using the metric system, sections are often one meter long, or 39 37/100 inches. We all have seen shelving in this country only thirty inches long, largely because it fits into the space available. I know of one library that has thirty different lengths of shelving in the same building, which I can assure you creates considerable inconvenience at the time of shifting the collections. The Widener Library at Harvard has 40-inch sections. In places where the stack ranges are nine sections long, they have the same total capacity as would ten 36-inch sections.

As soon as you begin to vary the length of the sections in a modular-system building, you become involved in the bay sizes. Since our bays are ordinarily figured on multiples of three feet, this can be a matter of considerable importance. However, we must not dismiss longer shelves without further consideration. The Ames Company of San Francisco is prepared to provide 48-inch-long sections at a considerable reduction in cost from that for the standard 36-inch sections. Six sections 48 inches long have the same capacity as eight sections 36 inches long. The reduction of one-fourth in the number of the shelves and two-ninths of the uprights makes possible, the Ames Company says, a reduction of more than 15 percent in the cost, even after using the heavier gauge of steel which may be required, because of the longer span, for very heavy volumes.

I will not venture to deny that there may be a reduction in cost, but I do not know how great it will be. I am not convinced as yet of the 15 percent savings. I remember Angus MacDonald telling me that the net cost with the 40-inch shelves in Widener installed in 1915 was no more than the standard 36-inch shelves would have been, but he felt that that was the limit without going to a heavier gauge steel, which would cost more than the savings from the reduction in the number of shelves and uprights. But I would be the first to admit that what was true in 1915 when the Widener stack was installed, or in 1950 when I talked over the problem with Mr. MacDonald, might not be true today. I suggest that there are other matters to be considered in this connection beyond the cost of the installation and the strength of the shelving, although neither of these should be ignored.

I have already noted that four-foot sections will affect the bay size, that is, the column spacing. It will, of course, have to be—if space is to be used to advantage—multiples of four feet between columns instead of three. If the columns are square and two of them take the place of one stack section, they can be up to 22 inches in the range, allowing two inches for the upright next to the columns. This will give bay sizes of 18, 22, and 26 feet in length, including the column, or 16, 20, and 24 feet between them. In the other direction, with square bays, they can be 4 feet 6 inches, 4 feet 5 inches, or 4 feet 4 inches on centers, respectively. This is possible and works in very nicely without an unreasonable waste of space for extra wide aisles. If the columns are to contain the vertical ducts and take the place of a full section of books, they will not work out as well. The bays must be 16, 20, and 24, or 28 feet apart, if square. If you are ready to have the ranges only four feet apart on centers, this is fine, but otherwise the sixteen feet will not work at all and the twenty-foot spacing will require ranges five feet on centers, which is very extravagant in a large book stack; the twenty-four-foot range will provide 4 feet 9 3/5 inches on centers, and the twenty-eight-foot range, 4 feet 8 inches on centers, both of which are unnecessarily wide. Of course, the bays do not have to be square so long as you do not want to turn the ranges in a different direction at a later time, and the architect and contractor are not worried about the effect of the irregularity on construction costs. There is much to be said for bays that are not square, but that is another story.

To go back to the 48-inch shelf, this is not impossible from the point of view of bay sizes, although it can be seen that it involves new problems. The long shelves may save money, although that cannot be definitely proved until practical tests have been made with competition between different companies. For a small library, any length of shelf that is not standard may be undesirable, because, for the manufacturer, it may mean special tooling up if the shelves are not in stock at the time they are ordered;

and they may represent an even greater problem at a later time if a few extra shelves are needed.

However, there is still another problem on which more information is needed before I would be ready to recommend the longer shelving, even if it can be proved that there is a cost advantage. This problem is the inconvenience, if any, to the user. Is the human body so put together that we can use a four-foot-long shelf to advantage?

Most of us have found that with catalog drawers, we prefer to go from top to bottom and then on to the next row to the right. This is so we don't get in the way of other users any more than necessary, rather than because of any physical inconveniences. I might add that, in some countries, catalogs are used the other way, going from left to right on the top row and then down to the next one and so on. With a heavily used catalog, one user may, with this system, block from use by others as many as one hundred drawers at one time.

Going on now to the printed page, we have found that lines which are too long make reading difficult, and moving from one line to the next may lead to confusion and delay. But neither of these problems is completely comparable with that resulting from a long book shelf, although there is some relationship between them.

It is true that if shelves were twelve feet long, users might interfere with one another in a busy part of the stack, or when one shifted to the next shelf, he might be confused. But the basic problem is a different one. With a shelf at eye height or one immediately above or below, one can move along readily at least for the length of a four-foot shelf. However, as one gets down lower in the section, it is quite a different situation. Even a young and agile person may find that, for the bottom shelf and probably the two shelves above the bottom, hitching along with partially bent knees, as will be required for a long shelf, will be difficult. I know that when one gets in his seventies and has bifocal glasses and a football knee, this is not a happy situation. But I realize that I should not be considered a typical reader, and a 15 percent reduction in cost might make inconvenience to a few seem a very minor matter.

I have been trying to figure out a satisfactory method of weighing the advantages and disadvantages of a four-foot shelf. The cost factor might be settled by a team representing perhaps three different stack manufacturers. I suggest, however, that anyone working on this aspect of the problem should keep in mind that the cost of the book stacks probably represents not more than 20 percent (and probably considerably less) of the total cost involved. If the stacks cost $50 for a double-faced section and you can house on the average one double-faced section in 16 2/3 square feet of floor space, and the construction cost for that space—including floors, lighting, and fees—is $21 a square foot, the space costs $350 and the shelving $50, or a total of $400. A reduction in the cost of the shelving of 20 percent would be $10, or a savings of 2½ percent of the total, or the same saving that could be obtained by reducing the distance between range centers by 1 2/3 inches, or by lengthening a few ranges by one section.

This brings me to the depth of shelving, the width of stack aisles, and the length of ranges. We will find that these three problems are fully as important as the length of shelves, if not more so.

Seven-inch-deep shelves are common and can be found in many libraries for large parts of the book stacks. I shall, in speaking of shelves, use their actual depth. The stack companies use the term "nominal," which is one inch deeper. Seven- or nine-inch shelves might be called standard for all parts of a library, except for the bottom shelves in some "free-standing" stacks, the shelving of atlases, newspapers, books in the fine arts, and for reference shelves where an eleven-inch depth may be found useful. Remember that bracket shelves have a two-inch space vacant in the center of a range so that a seven-inch shelf, without sway bracing, can shelve a nine-inch-deep book anywhere, unless the volume behind it is more than seven inches deep. This will take care of about 93 percent of all books. An eight-inch (actual)-deep shelf will take care of a ten-inch-deep book anywhere except when there is an unusually deep book behind it, and will be adequate for 97 percent of all volumes. However, most stack manufacturers hold that an eight-inch "actual"—nine-inch nominal—is an in-between size, not generally carried. I suggest that a shelf of this depth—eight-inch actual—is perhaps the best of all for most shelves in some universities.

One of the advantages of bracket shelving is that you can use different-depth shelves on the same upright, something that is difficult to do with slotted stacks without special arrangements. But, as indicated earlier, unless the shelves are strengthened in some other way, sway braces are needed, and sway braces prevent the use of the two inches just mentioned. Sway bracing may be slightly cheaper than any other types of reinforcement, but the inches they use are so valuable that I doubt if any of us should afford this type of bracing. As was noted earlier, the square footage occupied by book stacks is worth perhaps six to seven times what the stacks themselves cost. The space used by sway braces is, in my opinion, an inexcusable luxury as well as a nuisance.

To summarize a bit, I suggest that stacks always be fastened to the floor for safety's sake; that they be strengthened, if necessary, in other ways than by sway bracing; that they be equipped with shelves the same width all the way up, instead of with wider bases. As to the width, I suggest that the shelves be only seven or eight inches deep, actual measurement, unless the bay size gives you no advantage this way. Seven-inch shelves save 4 percent of floor space worth 25 to 30 percent of the cost of the shelving, and 10 percent or more in the equipment cost. Eight-inch shelves will require fewer deeper shelves for oversized books.

Another complication must not be forgotten—that is, finished bases. Should they be sixteen inches, eighteen inches, or deeper, and should you have them at all? They present a more finished-looking job. There is no place under them for dust and dirt collection, and they are a stabilizing factor. The cost of shelving goes up nearly 10 percent with every two inches added to its depth. It is true that the cost of the space is much more important than the added cost of the shelving but, here, narrower shelves save space as well as money. Each library must decide for itself what it wants to do about the depth of shelving, but the facts that I have just mentioned should be kept in mind.

Before deciding on shelf depths, aisle widths should be considered. Again, there are various factors, the chief one being the bay size available; then the anticipated amount of use. Open- or closed-access shelves make a difference. The length of the ranges and the cost of space are also important. Aisles 36 inches wide are sometimes called standard for an open-access stack, but every inch this can be reduced saves something like 2 percent of construction cost, not book-stack cost. To visualize this, let us say that a 1,500,000-volume stack takes—to use a commonly accepted formula of fifteen volumes a square foot—100,000 square feet of floor space. If you reduce the aisles two inches, it saves 4 percent, or 4,000 square feet of floor space. If you reduce both aisle width and range thickness by two inches, the reduction will be 8 percent, or 8,000 square feet, which, at $21 each, would save $168,000. I am not saying that this is a desirable saving, and there are many cases where it would not be worthwhile, but you must evaluate your local situation and then decide.

To return to the aisle width: You should have sufficient room (1) for the bottom shelves to be adequately lighted (more of that later); (2) so you can squat down to read the bottom shelf and select and remove the desired volumes; (3) so that a book truck can get through and you can take a book from a truck and reshelve it; and (4) so you can pass another person without too much difficulty. The book-truck problem can be partially solved by specially designed trucks, but their capacity is adversely affected; the squatting down depends a great deal on the size and agility of the person concerned. How much must (or should) you cater to the elderly, stiff, rotund faculty members with bifocal glasses and poor eyesight? Again, you must decide. How heavily is the aisle used and how long is it? The larger the book collection—other things being equal—the less any one aisle is used. The length of the aisle affects the amount of use and also affects very considerably, as we shall see later, the total stack capacity. It is suggested that aisles in a reference room or in an undergraduate open-access stack with 100,000 volumes should not be less than 36 inches wide, or ranges more than eighteen feet, preferably 15 feet long. This would also be true in a public library open-stack collection of limited size. However, in a large collection with limited use, a 33- or 34-inch width for an aisle is entirely adequate; a 32-inch width is not impossible, and, in a very large library with fairly limited access, 30 inches is a quite satisfactory width. This means that, with ranges 16 or 18 inches deep, 48 inches on centers will do for a large, little-used collection, and 51 or 52 inches on centers will be entirely adequate. I will not attempt to speak here of the effect of this on column spacing, but it is a matter of considerable importance. I might say that I have worked on a very large library this past year where a four-foot-range spacing has been adopted in place of a four-and-a-half-foot one, and where a net saving of a million dollars will result.

Now a few words about range lengths. I have already spoken of the desirability of short ranges in parts of a library with very heavy use and I believe this to be important. But a very large, comparatively little-used collection is a different proposition. Ranges 30 feet in length have in the past generally been considered the outside limit for any library, but the new National Library of Medicine has ranges up to 36 feet long without, so far as I know, feeling that it presents a problem. The storage levels of the Lamont Library have ranges as much as 51 feet long and, for the use to which they have been put, this has been quite satisfactory. If there were two 3-foot-wide cross aisles or one 6 feet wide put in the 51-foot ranges, resulting in three 15-foot ones, instead of one 51-foot range, the capacity would have been reduced from seventeen sections to fifteen. Seventeen is 2/15, or over 13 percent, greater than fifteen. I know of a national library in another country which has ranges up to 60 feet in length and is not unhappy about it. If you gain 13 percent of capacity by narrowing ranges and stack aisles and add 13 percent to the 13 so obtained by lengthening ranges, it gives a total increase of 28 percent. I might go on and talk about the difference between six-foot-wide cross aisles and four-and-a-half-foot ones—this makes a difference of 7½ percent with 21-foot-long ranges, and a three-foot, instead of a six-foot, aisle would mean 15 percent—but we are talking about book stacks, not aisles, and I must go on to other problems.

We must still deal with the height of the cases and then face the problem of finishes and attachments. Multi-tier stacks came with different height floor levels, although they were often 7 feet 6 inches on centers, i.e., 7 feet 6 inches from the first floor to the level of the second floor. If three inches were lost in the floor thickness, plus the ventilation slots, each level was 7 feet 3 inches in the clear. But often they were only seven feet. I know one multi-tier stack with only 6 feet 9 inches in the clear. Too often, lights are so arranged that the top few inches are difficult to use. In recent years, a full 7 feet 6 inches has become more or less standard. This is fine, but some librarians and architects do not know why. I like to explain it in this way: The top shelf should not be so high that those using the stack cannot reach it. Most people, even if no more than five feet in height, can reach up to get a book from a shelf 6 feet 4 inches above the floor. If the top shelf is any higher than that, it is unreachable to so many people as to make it inadvisable. Studies made by Van Hoesen at Brown University and Fremont Rider and others showed that some 90 percent of all books are less than eleven inches high. A steel shelf is not more than three-quarters of an inch thick and, if shelves are placed twelve inches on centers, a book just under $11\frac{1}{4}$ inches can slide in. With seven shelves 12 inches on centers, with the top one at 6 feet 4 inches above the floor, the top of the bottom shelf will be four inches above the floor, making possible a three- or four-inch base for protection of the books there. If the distance between shelves is cut one inch, eight shelves will still not be possible, so there is little to gain from it. Adding a few inches more to the height so as to make the eighth shelf possible would place it beyond reach. With seven shelves 11 inches apart on centers, the total height can be reduced to just under seven feet, which is too low for comfort. Also, there will then be some 11 percent of books that cannot go on these shelves, in addition to the 10 percent which are more than eleven inches high, or 21 percent in all—enough to make shelves so placed entirely undesirable. All things considered, the 7 feet 6 inches in the clear seems most satisfactory. The Widener Library with 7-foot 2-inch stack heights can install only six shelves. If it could use seven, the library's capacity would be one-sixth greater, and 350,000 more volumes could be stored in it, something which, I can assure you, would be much appreciated. But if a book stack should be at least 7 feet 6 inches high, is an upper limit beyond that of any use? It depends on what you do with the extra space. The higher you go, the greater the square footage cost. You might build high enough for an eighth shelf, and then use that eighth shelf as storage for less-used books. It would be comparatively cheap space, but it would also be confusing. I do not recommend it in most circumstances.

A book stack area under 7 feet 6 inches in the clear is high enough for individual accommodations for readers in carrels anywhere in the stack, and, in fact, 7 feet 6 inches is high enough for small groups of readers if care is taken to place them where they can look out in some direction for a considerable distance. In the Lamont Library, there is a mezzanine 91 by 45 feet. It provides seats for seventy-five readers who apparently work in comfort with a 7-foot 9-inch ceiling. Some of them are 75 feet from any outside light. At Princeton, 8-foot 4-inch ceilings on the stack levels permit adequate heights for rooms largely given over to human occupancy that are as much as 25 by 36 feet or even 25 by 54 feet in size.

There is no upper limit in stack height except the cost factor and the fact that the higher the lights are hung, the less efficient they are on the lower shelves. This brings up a new method of stack lighting that has been used in a number of libraries in recent years. In order to gain flexibility and to make it possible to shift ranges closer together or farther apart without changing the lighting fixtures, rows of fluorescent lights are placed at right angles to the ranges instead of over the center of the aisles. Adequate light is still available and the rows of lights can be set up to six feet apart instead of 4 feet 6 inches or less which the standard arrangements require, thus saving installation, upkeep costs, and charges for current. I will not attempt to go further into the lighting problem, except to make two points:

If the lights are at right angles to the ranges and the stacks 7 feet 6 inches high, the ceiling should be at least eight feet and preferably a little more to prevent the lights from overheating the books on the top shelf.

The narrower the aisles, the more difficult it is to light the bottom shelves properly. There may be good light on the floor, but the backs of the books are at right angles and get little light, perhaps as little as one and a half or two foot-candles. This may seem terrible, but actually it is better stack lighting than any of us had a generation ago, and few persons use bottom shelves for long consecutive periods. In an attempt to improve lighting on bottom shelves, those shelves are sometimes tipped forward so as to obtain a better angle for the light to strike the back of the books, but such shelves are costly in space as well as in construction; they have the added disadvantage of tending to let the book slide or be shoved to the back of the shelf where it loses the advantage of the better angle and looks bad. The use of fluorescent lighting in book stacks gives more adequate bottom-shelf lighting than was possible with incandescent bulbs, even with special fixtures, partly, at least, because the light source is lengthened and the reader's head does not get into his own light. One other problem with fluorescent lights: They are most suitable when they are not turned off and on frequently, as that shortens their lives. The question then arises: can you afford to leave them on all day? This is just one more problem that must be faced.

When all these questions about the stack structure have been decided, what about its color and finish? Shelves used to be almost exclusively black or khaki. With standard shelving, some installations had the divisions between sections and the end panels painted white so they would show the dirt and could be washed, I suppose. It was finally realized that the cost of other colors would not be great and that the use of color would make shelving less monotonous and more attractive. A dozen colors are now available. A different one can be used on each level if desired. Some people like intense colors. Others prefer quieter tones. Of equal, or greater importance, at least from the functional point of view, is the finish. The paint or enamel must be hard enough so it will not chip easily. If it does, the underlying steel will rust with distressing results. Manufacturers may differ in the number of coats of paint they think are required, the amount of sanding between coats, and the temperature of the baking. Some prefer spraying or dipping to brush painting. These are very technical questions, which I am dodging, except to speak of their importance and to say that, too often, stack installations have not been satisfactory because of poor paint jobs.

Almost all book stacks require one or more accessories: range label holders, shelf label holders, and book supports. No one of these should be neglected. All cost money but will cost more later if they are ordered separately or in small quantities.

Range label holders can be flat against range ends or stand out, often in wedge shape, so as to be in view as one walks down the cross aisles. If they stand out, have them high enough so that a tall man will not bump his head on them or put out an eye. With either variety, be sure they are large enough to contain the required information without having the print or type so small as to be difficult to read. This is particularly important with long ranges.

The problem with shelf label holders is to make them readily movable but still not easily moved when you want them stationary.

There is not time to go into details on book supports. Be sure that they will stay put where you want them to, and still be easily shifted; that they are so made that they will support books of various heights and also that they do not present thin edges which, with a careless shelver, will knife a book being shelved. A few libraries have preferred to use bricks or concrete blocks, covered with heavy brown paper, or better still, with buckram for book supports. The Houghton Library at Harvard has used glass bricks in some places. They are quite decorative. Some book supports are suspended from the shelf above, but generally they are placed on the shelf with the books to be supported.

We should say a few words about vertical communications in a book stack—stairs, book lifts, elevators, pneumatic tubes, and endless belt conveyors. Stairs take space and sometimes cause the user to get lost if they go around several corners and land one with a different orientation on different levels. Make stairs as simple as possible; not too wide or too narrow, not too steep or too easy. Install them in such a way that they do not add to the fire hazard by making a chimney. A book will be published soon by the Library Technology Project of the American Library Association which discusses fire hazards in a library. The book should be useful in this connection. I will limit myself here to suggesting that you avoid sprinklers in a book stack. Water may be even more dangerous than fire.

Book lifts must sometimes be installed because of lack of funds for elevators, but remember that, unless you have an attendant at both ends, a book lift may be a snare and a delusion. What it will amount to is that the librarian will not be saved stairs and the books will be subjected to unnecessary handling at each end of the line. While it is true that readers are sometimes hard on books, too often it is unnecessary and careless handling by the library staff that does more harm than readers.

An elevator, even if it is just large enough for a fairly thin attendant and a book truck, can be installed and its use restricted to the staff by having it operated only by key. It will save weary hours of labor and wear and tear on books. It will also take care of physically handicapped persons, or, for example, a senior faculty member with heart difficulties.

Pneumatic tubes to carry call slips from desk to stack stations have been used for many years. They tend to be noisy and if call slips are in the form of punched cards which must be kept flat, they involve complications. In this connection, at least one large university library has had serious difficulties lately. It is possible to use a telautograph or teletype, or a public address system in place of pneumatic tubes. Pneumatic tubes have been used for the transfer of books over long distances, but they go so fast and stop so suddenly that they may present a serious hazard to the books.

Endless belt conveyors have been in use in libraries at least since early in the century. They also may be noisy. Too often they get out of order, generally because we have made them too complicated, tried to make them turn too many corners, run on different planes, and receive and drop books at many stations. The most satisfactory installations have been the simplest. Of course, they are now used on a large scale in industry, and the manufacturers know much more about these problems than they did in earlier years.

A few libraries have installed escalators in place of lifts or ramps. They can be very satisfactory, but they tend to be noisy, expensive in space, expensive to operate, and can be a great nuisance when they get out of order. Whether or not they are desirable may depend on the number of elevators they can replace.

A few words about stack carrels. Carrels installed at right angles to a stack-room wall can be the most economical seating arrangement to be found anywhere, particularly if they are placed at the end of a blind aisle, but also to a lesser degree, if next to an aisle which is required anyhow. If the continuity of the wall is not affected by columns or heating pipes, carrels can be spaced as desired, even as close as four feet on centers if the table is held down to 22 inches, does not have a shelf, and the chairs do not have arms. Spacing of 4 feet 6 inches on centers is almost luxurious for undergraduate use; five to six feet is very satisfactory for a graduate student writing a thesis, if the table is at least 42 inches wide. In many institutions, carrels can well be open without doors, but all this is a little out of my field today.

There is time only for brief comments about compact storage. An article in the March, 1962, issue of *College and Research Libraries* considers this problem. The subject might be summed up by saying that, unless the construction cost of space is high, it may often be cheaper and more convenient to use narrower aisles, shallower ranges, and commercial shelving rather than the expensive, sometimes equally inconvenient drawer and hinged-type shelving or even the Compactus ranges which can be shifted by hand or by motor. A decision on any of these methods should be reached only after careful calculation of cost. On the other hand, if the use of "compact shelving" can make new building construction unnecessary for a considerable period, it can be a wonderful solution to the space problem.

I have omitted discussion of stack capacity per section or square foot. It will be covered in detail in the book on which I am presently working.

I hope nothing that I have said in so much emphasis on savings in cost and space that unduly crowded and inconvenient stack installations will result. An adequate, convenient, functional installation should always be uppermost in our minds. Costs are important, indeed, very important, but they are still secondary.

QUESTION: Can you make additional comments on the $21 per square-foot figure for building costs as related to stack costs and also for additional comments on the arrangement of lighting at right angles to the stacks as related to the height of the ceiling?

MR. METCALF: In regard to the cost, the figure of $21 that I used will, of course, vary in different parts of the country. You can do it in this section of the country, for, perhaps, $15; you can do it in some places in Massachusetts for $28—a great deal of difference from one place to another. I used $21 simply as a rough figure. But the basic cost of the stack space is very much the same as any other space without equipment. In the modular building, you have so much floor space. The modular building has floor covering; it has a ceiling with lights—not very much different from one to the other, if you have a flexible building such as we're trying to build today. In regard to the height, 7 feet 6 inches is all you need for book stacks. I agree that we would be unwise to build a building with nothing but 7-foot 6-inch ceilings. If you have the additional height of 8 feet 4 inches, you can run your lights perpendicular to the stack aisles and also have a lighting arrangement that would give you some added flexibility. I shouldn't get into the question of ceiling heights this afternoon, although it is something I am very much interested in and would be glad to talk with you about later. There have been a good many studies; the 8-foot 4-inch ceiling height you are speaking of was decided on for Princeton after a mock-up was built. A group of people representing everybody concerned in the library observed the mock-up: the ceiling was cranked up and down and when it got down to 8 feet 4 inches, people hollered and that's why it was decided on. Up in Boston, I can show you a ceiling that is 9 feet 6 inches in a room 131 feet long. The room is perfectly comfortable because various things were done to make it comfortable.

On the other hand, I don't believe that any of us would want to build a building the size of this and of this quality, with ceilings at the entrance level of no more than 9 feet 6 inches in the clear. You want to get something else, and there are several ways of doing this. You can keep the ceiling down in some parts of the building and have it higher in other parts. In the Lamont Library, which I think gives the impression of being spacious, you come into a floor with a ceiling, part of which is 13 feet high and part 15 feet high, and you have the impression of a building very spacious and extravagant. The average height of all the rooms in Lamont—that is, all of the space in Lamont—is 8 feet 6 inches. It is difficult for people to believe that this is the case. You can do all kinds of things with height. I had a room made at Harvard with a ceiling 6 feet 8 inches, in which people lived for twenty years just to prove that it could be done, but I don't recommend it.

QUESTION: Should the architect or the librarian be concerned with the design load of flooring?

MR. METCALF: The strength of the floor is what the floor would carry. Certainly the librarian could not be expected to be an authority on the subject. He should have this much to say about it: "I want to be able to put book stacks anywhere in this building that I want to put them and put them at reasonable distances apart." Then it is up to the architect and the engineer to provide answers as to how big the base size can be without carrying that load, without it being unduly expensive, how thick the beams have to be, and so forth. The librarian should never be asked to decide on those technical questions; he should be expected only to give the requirements that he wants for the building. And if he gives unreasonable requirements, the architect ought to be able to respond with, "Yes, we can do this, but it's going to cost you an extra $100,000." That kind of thing. Is that satisfactory?

QUESTION: With the lighting at right angles to the stack aisles, what would be the illumination level at the mid-point with ranges of from 15 feet to 18 feet long?

MR. METCALF: There are too many variables there to tell you the whole story. With the lights at right angles, you're going to get, on the average, as much light as when they are parallel. As we all know, fluorescent lights shine out at the sides rather than the ends. One is interested in the light all the way from the top shelf down. Having good lighting on just the top shelf or the middle shelf doesn't do you any good if you can't see the bottom shelf at all. Those are just some of the problems. The type of floor covering you have, the type of ceiling you have, the amount of reflection that you get—all of these, of course, make a difference. I might have added one other thing about the bottom shelf. If the bottom shelf is wider than the shelves above, the light doesn't have as good a chance to reach it because it is narrower down there; the effect is as if the shelf were the same width as the shelves above. The lighting on the bottom shelf depends, to a great extent, upon the width of the aisle. This is a very complicated matter.

QUESTION: Is it necessary to install lighting parallel to the ranges?

MR. METCALF: I don't think it makes very much difference, and libraries that have installed lights at right angles, instead of parallel, have been, so far as I know, just as satisfied as the others. The question of lighting is very, very complicated and so much of it is a question of relative situations. For example, if you come in to a book stack and go immediately to a bottom shelf, which is poorly lighted, you probably will be able to find what you want, and then you stand up where you have ten times as much light, and it will look very bright.

QUESTION: In planning a new library building, how should one consider the problem of whether to install lighting parallel to the ranges?

MR. METCALF: Yes, I see your point now. There it just depends on whether you think you will ever want to move the ranges closer together or farther apart, because the old, regular way of putting the light parallel to the ranges will lead you into a predicament if you ever shift the ranges farther apart or closer together. In one way, this simply gives you additional flexibility. On the other hand, if you want to turn the stacks at right angles, you're in trouble again. It is a compromise, like all these things that I have been talking about. I have said some things this afternoon, and said them rather strongly, while I could argue on the other side just as well. But I have been calling attention to things that I want librarians, architects, and stack manufacturers to think about more than they have in the past. Moreover, each library must decide for itself as to what it thinks its going to need fifteen years from now. One of our difficulties is that none of us knows what the use of our library is going to be in the future. We're getting as much flexibility as we can. We're building as flexibly as we can and we think we can do better than we have in the past. I am sure there will be changes ahead, changes that will make a good many of us now working on buildings feel pretty silly if we live fifteen years more.

QUESTION: If a seven-inch shelf will take care of 90 percent of books in a library and an eight-inch shelf will take care of 97 percent of the books in the library, is it worth the extra expense of eight-inch shelving to take care of the extra 7 percent of books?

MR. METCALF: This just brings up the point that I have made before. Each library must decide for itself. If I said that the seven-inch shelf—and what I meant to say is a seven-inch shelf with two inches behind, making nine inches—will take care of 93 percent, according to the best figures that I've been able to find. The eight-inch shelf, which makes possible the shelving of ten-inch books, will take care of 97 percent. These are figures that Fremont-Rider worked out in connection with those that were done by Van Hoesen at Brown some twenty years ago. I have not studied them myself, except that I am convinced that they are as good as any figures you can get. However, I must say that they won't be the same for the University of Florida as they would be for New York Public Library or Cornell University.

QUESTION: I am concerned about the problem of sway braces which, by blocking the passage of books across the center line, tend to interfere with shelving of the small percentage of the books larger than those for which standard eight-inch shelves are suitable.

MR. METCALF: The problem is this, as I see it: suppose 5 percent or 10 percent of the books fall into this in-between group. What are you going to do with all the ones that cause trouble as they are now shelved, because of sway braces? Suppose you take one third of those books which are too deep, and you reclassify them, and then suppose that next week or next month or next year you have to re-shelve the collection? This means another few percent you have to shift, and then another. It is a good deal easier to do it all at once and know what your situation is, in my opinion. This is a large enough figure, particularly if you have the seven-inch shelving (which is less expensive, as Miss Voigt indicated), which would allow for the nine-inch book without the sway braces. The difference between a seven-inch book and a nine-inch book is considerable and there are a whole lot of books in that group. But it is a complicated matter and the library must decide what it is going to do. I just want to point out what the problem is and then have you decide. My own opinion is that if you can avoid sway braces by arranging the stacks in some other way, then, in most libraries, you will save money in the long run.

QUESTION: Has there been research on materials used in book stacks other than steel, wood, and aluminum?

MR. METCALF: Perhaps this is a problem to refer to the Library Technology Project. I have been interested, personally, in finding some other kind of stack for a good many years. I have approached stack manufacturers and architects and asked, "Hasn't the time come when we can build stacks out of plastic or fiberglass of some kind that would be lighter and would stand up?" So far, the only answer that I have been able to receive has been, "Yes, we could build it, but we are afraid you would walk in some morning and find it all on the floor." Again, this is not a librarian's job; he can only ask the question. I think it is up to the architects and the manufacturers to look into it; but we ought to stimulate them and I am glad you asked the question.

MR. POOLE: We cannot add anything to this except to confirm Mr. Metcalf's experience. We too have talked to manufacturers about this point and have received the same answer. The problem with shelving seems to be the same as with plastic or fiberglass catalog card drawers. We know that some experimentation is going on; some of you may have seen molded plastic drawers in home furniture. Plastic is more frequently used for drawers in institutional furniture such as dressers and tables. In that type of furniture, drawers are not required to be so rugged; they are larger and do not have to be fabricated to such close tolerances. Both plastics and fiberglass are being used for this purpose but the information we have received from manufacturers is that it is not yet time to use these new materials in card catalog cabinets or in shelving. The state of the art is such that it just isn't possible yet.

MR. METCALF: One other point that I would like to make, since I have the opportunity now, is somewhat connected with the matter we have been speaking of. It doesn't have to do with stack equipment, but does have to do with other equipment. At Widener Library at Harvard, the consultation tables adjacent to the card catalog are covered with battleship linoleum. This was installed in 1915 and, over the past forty-seven years, it has received punishment that very little linoleum has been given. The surfaces have been neglected, have had nothing done to them to date, and they are just as good as they were forty-seven years ago. But you can't get that product anymore. You ask an architect, or a builder, and they say it simply is not produced anymore. There is insufficient sales volume to make it worthwhile. This is the kind of situation in which I hope librarians will make their needs known—and push. Perhaps, if we push the equipment people and the architects enough, they will be able to get a better quality of material. The Widener Library has sections with cork floors that are forty-seven years old, that have been neglected, that have never been oiled, waxed, or buffed. The flooring is just as good today as it was forty-seven years ago. It doesn't look very well, but there it is. Can you find cork today that will stand up like that? You can get the best quality of cork you can find today and have a girl with spike heels sit at a desk and the floor will be gone in a few weeks.

Cork floor is a very good floor, but we can't get quality in some things as we used to. I hope we will use our influence to encourage the manufacturers to try to get us materials of better quality in many library applications.

• 3 •

PANEL DISCUSSION:

Specification Writing and Bidding Procedures for Furniture and Shelving

On Friday evening, June 15, a panel discussion meeting was held on the subject of writing specifications and bidding procedures for library furniture and shelving. The panel was made up of three members: Hoyt Galvin, librarian of the Charlotte, North Carolina, public library, who presented the viewpoint of the librarian; and, representing the manufacturers' viewpoint, Homer Lombard of the Art Metal Construction Company and Hal Syren of the Library Bureau, Remington Rand. The meeting was moderated by William S. Geller, assistant librarian of the Los Angeles County Public Library, who made a few introductory remarks and also presided over the discussion period following the three presentations.

MR. GELLER: Now that all of you have acquired that hard-to-come-by money for the beautiful equipment you want so much, we come to the harsh reality of buying it. Perhaps all of you have come to this stage by this time, and there are, I am sure, many of you who have reached this point several times.

Obtaining the best equipment for the money available puts the most experienced librarian to test. This ordeal entails the writing of specifications which can be defined as a complete physical description of what you want and then asking for bids from manufacturers in the field. How do we do this? No guaranteed results can be foreseen but, collectively, we have with us a great pool of experience in sales and purchase of shelving and equipment and a practicing library administrator who can give us some advice on obtaining the equipment we need. The manufacturers' representatives have a wealth of experience, and I am sure that we can all gain some help from it.

HOMER LOMBARD: The opportunity to present a manufacturer's viewpoint on specification writing and bidding procedures for library shelving is very much appreciated.

It is important that the specification document covering steel library book stacks and related equipment be a detailed, precise, and explicit description of the equipment to be furnished and the services to be performed.

The fundamental components of a good set of specifications include a description of the equipment, illustrated by the drawings and characteristics of the equipment.

Preliminary to preparing steel book stack specifications, the specification writer should review the drawings and confer with the architect, librarian, and consultant—requesting their advice as to details, features, and conveniences to be specified and to determine the type of book stack that will best serve the requirements.

The initial specifications should be reviewed with the architect, librarian, and consultant and revised, if necessary, to make certain the final draft is a complete description of the equipment to be furnished.

The specification document should stress the importance of and necessity for providing a satisfactory and durable finish for steel book stacks, a finish which has been time-tested and proved to meet the requirements.

The two recognized styles of book stack ranges generally specified are standard-type and bracket-type book stacks. Both kinds serve their purpose and are furnished for single-tier installations.

Single-tier book stacks are generally "free-standing" ranges but, occasionally, because of law or custom, top-braced ranges are specified.

Multi-tier book stack installations include: book stack ranges, deck floors, stairs, railings, enclosures, booklift, occasionally a book conveyor, and, frequently, study carrels. Multi-tier book stack construction provides maximum book capacity per cubic foot of building area.

Standard-type book stack ranges, because of the design, are often specified for stack areas which are equipped with study tables, carrels, and chairs for the use of students and readers and which are located in convenient proximity to the books. Standard-type ranges are also generally preferred for law, business, research, and rare book libraries as well as for reading rooms.

Bracket-type book stack ranges are frequently furnished for public, college, and university stackrooms and are specified because of their simple design and because of several convenient features which can be readily incorporated to serve a variety of requirements.

Book stack accessories should be specified to conform to the requirements of the library and generally include: range finders, range end label holders, shelf label holders, book supports, and, occasionally, sliding reference shelves and movable work tops.

Specifications for finishing the book stacks should define the materials and methods for cleaning and preparing the parts to receive the prime coat, application and baking of the prime coat, inspection process, and the application and baking of the final coat with an eggshell gloss finish giving a reading of 40 to 65 degrees on a standard gloss meter. The finish should be capable of withstanding the most severe tests of bending and hammering without flaking, cracking, or loss of adhesion. The final finish should be of 1.40 mils thickness (as a minimum) and capable of resisting acetic acid, household ammonia, 10 percent lye, alcohol, cigarette burn, salt spray, abrasion, printing, and all normal usage resistance requirements of a good finish.

Specifications frequently include the following features:

1. Free-standing book stack ranges braced longitudinally without the use of diagonal sway braces or exposed gusset plates.
2. Provisions for inserting a future expansion shelf at top of each bracket-type shelf section.
3. Adjustable bracket shelves furnished with folding brackets.
4. Top shelves arranged to accept shelf label holders and wire book supports.
5. Periodical ranges for display of current issues and storage of past unbound issues furnished with self-stowing periodical display shelves.
6. Study carrels furnished with provisions to receive wiring and future reading lamps.

The *Notice to Bidders* should include the following statements:

- "Drawings and specifications will be issued to steel book stack manufacturers who are qualified through their experience to manufacture, deliver, and install the steel book stack equipment required by the drawings and specifications.

"Each prospective bidder shall submit data to demonstrate, to the satisfaction of the architect, his facilities and ability to perform work of the character and scope specified.

"As part of the pre-qualification requirements, each prospective bidder shall submit a list of ten or more book stack equipment installations of equal or greater magnitude which he has executed within five years of the date of the current specifications, giving names of owner, architect, date of installation, and contract price for each installation. Prospective bidders shall submit the required data and obtain approval of their application ten days prior to date of receiving bids.

"Bidders should examine all drawings relating to the steel book stacks, and become fully informed as to the extent and character of the work required and its relation to other work in the building.

"Each bidder, prior to date set for receiving proposals for steel book stacks, is to deliver and install steel book stack samples complying with the specifications.

"Book stack samples are to be full-size, double-faced and two shelf sections long with end panel on one end of sample. Accessories as specified are to be submitted. Each bidder is to have equal time to demonstrate his product.

"Proposals for steel book stack equipment will be considered in conjunction with samples submitted by bidders. The committee reserves the right to reject proposals submitted in conjunction with samples not complying with the specifications.

"If additional data is required prior to awarding contract, the committee reserves the right to test bidder's samples based on the use the book stacks are to serve. The results established by the tests will be considered by the committee in awarding the contract for steel book stack equipment."

HAL SYREN: An interesting article written by Miles O. Price of Columbia University was published in the April 1, 1958, issue of *Library Journal.* Mr. Price discusses the letting of contracts based on competitive bids and his article contains much important information for architects and librarians.

I quote: "The term, 'Lowest responsible bidder' has occasioned some difficulty, but as defined by the courts, it seems to mean substantially the following: 'Lowest' is plain, provided the specifications are observed and the bid is thus properly made. 'Responsible' means, first, a bidder financially able to do the job, to see the work through to a satisfactory completion. But it means more than that. Mere specifications are unsatisfactory standards by which to judge a completed job. Work may adhere so closely to them as to render rejection of the completed work impossible, but still produce a shoddy result. The courts, universally consistent with the requirement of good faith on the part of the awarding officers, demand something more. This is both the ability and the will on the part of the contractor to fulfill his contract, not only to the letter but according to its spirit as well. The awarding officers in their limited but sound discretion may, therefore, require demonstrated skill, ability, integrity, good morals, experience, and adequate facilities. Judicial interpretation of the term 'Lowest responsible bidder,' is the same in federal government situations as in state and municipal, as stated in O'Brien vs. Carney: The selection of the lowest responsible bidder by the contracting officer is an exercise of discretion, and, therefore, not subject to review by a court. 'Responsible' means something more than financial ability, capacity, and integrity. A lowest unsuccessful bidder can neither compel the contracting officer by writ of mandamus to enter into an agreement with him, nor enjoin the performance of the contract made with the bidder's successful competitor, nor recover damages for the government's refusal to enter into a contract."

A survey of awards made during the past year covering library equipment brought out some very interesting information. This survey covered some twenty-five awards and totaled about one and one half million dollars. In some instances, public funds were involved. The award was made after careful examination of samples and visiting installations listed by the bidders and was given to the lowest responsible bidder.

I can give you a few examples. The figures I will use are approximate and the bid award may not have been to the lowest bidder. I cannot reveal the names of the institutions involved because the information was given to me in confidence. We will give the lowest bid and the amount of the award only as there may have been several other bids.

1. A public library; lowest bid approximately $16,000; award made at $20,000.
2. A college library; two awards made; lowest bid approximately $58,000; award made at $72,000.
3. A high school library; lowest bid approximately $12,000; award made at $16,000.
4. A public library; award made at approximately $19,000; low bid not revealed.
5. One of the largest library equipment orders placed during the past year; award made at approximately 10 percent over lowest bid.
6. A public library; lowest bid approximately $165,000; award made at $200,000. This covered several projects.
7. A college library; lowest bid approximately $150,000; award made at $178,000.
8. A college library; lowest bid approximately $85,000; award made at $100,000.
9. A public library; lowest bid approximately $87,000; award made at $125,000.
10. A college library; lowest bid approximately $72,000; award made at $100,000.

Many contracts were placed with the lowest bidder, but we found, in one instance, in which the award was made to the lowest bidder, that the equipment proved to be unsatisfactory and, on a later bid, this same low bidder was disqualified and his bid was not considered.

Occasionally we find an architect or librarian who will attempt to prepare specifications covering library equipment, perhaps thinking that they do not wish to be under obligation to manufacturers or their representatives, or perhaps that they may want to be fair to all manufacturers. From their friends, they secure copies of specifications used for other buildings, or copies of standard specifications and catalogs from manufacturers. The architect and librarian study these documents with great care and find something in one and something else in another. They then set about to write their own specifications. To the manufacturer, this is most unfair, as he must then be expected to fabricate equipment to meet these specifications. To the owner, the cost can be increased as much as 50 percent. The practice could also result in everyone bidding on an alternate, causing confusion. The suggestion here is that trained consultants on library equipment are available; they have the knowledge to study your problems; and they will prepare specifications which will help you in getting good bids.

Specifications should be written in a definite, precise style and should be a complete statement of what is wanted for a specific project. Because of the technical nature of library equipment, the specifications should be fully descriptive of all items. The listing of a manufacturer's catalog numbers or "approved equal" *only* is not sufficient. Experience in designing, manufacturing, and installation is essential to the successful execution of a contract, and subsequently, the proper maintenance of a library.

Therefore, these specifications must include the qualifications and conditions that an acceptable bidder must meet.

1. A bidder must be able to manufacture in his own plant, or in a plant of a single company which he represents, at least 80 percent of the equipment he proposes to furnish. I recall that at a meeting in which samples of library equipment were to be discussed, a local department store had submitted the low bid. Because of the store's high standing in the community (and because it was a local taxpayer) its bid was accepted without a statement showing who would manufacture the equipment as specified. Nor were samples available. Their representative, upon being questioned, stated that equipment would come from reputable furniture builders, whose lines he had sold for years. The librarian, who was present, wanted additional information; he questioned the representative further and brought out the fact the wood shelving would be made in a nearby millwork plant, the table tops in a factory different from the one making the legs, and so forth. The librarian learned that *eight* factories would have been engaged in completing the contract. (Incidentally, imagine the finishing problems alone.) He rightly concluded that the library should not be used as an experimental work shop.

2. Special items: A full description of each item should be prepared and each bidder must bid accordingly. Any attempt to substitute a product of commercial manufacture, or one which deviates in any way, should automatically disqualify the bidder.

I recall one library in which the details and specifications for a circulation desk had been worked out to the satisfaction of everyone. There were units for housing book trucks, units for special charging cards, a pneumatic tube station, etc. The award of this contract was made to the low bidder after he had been questioned about his understanding of the details of requirement. His shop drawings were approved but, as sometimes happens, some details were not clearly shown. When the desk was installed, it was discovered that, although trays for the cards were the correct size, the manufacturer had neglected to allow space for the guides in height: follower blocks were omitted: slots in the charging desk top were reversed: the book truck unit would not take a truck with rubber bumpers, and so on.

3. Standard items: If these vary from items specified, the bidder should, at least two days prior to the opening of bids, furnish a letter outlining the important points of variance from specifications and should

include complete drawings and specifications. There are many unsatisfactory installations in this country, installations in which the purchasing authority looked more at the dollar savings than at enforcing the specifications. After an installation is made and in use, enforcing the specifications retroactively is almost impossible, unless the problem has been foreseen and properly handled in the specifications.

4. List of installations: Each bid should call for a list of ten installations made in last five years.

5. Samples should be called for and submitted prior to the opening of bids and should not be changed or withdrawn after they have been deposited. Samples should be tested by an independent laboratory. These samples should be deposited before bids are opened and if samples are not delivered, the bid should be disqualified.

Samples of equipment, in our opinion, can be of the greatest help in making awards on library equipment contracts. This is one way to determine who the lowest responsible bidder shall be. Frequently, it is found that the *lowest* bid is not the *best* bid.

6. Guarantee of equipment for at least one year: It is necessary that your specifications requirements be made as precise as possible so that *your* library will be furnished with equipment that *you* want. Specifications may vary, depending upon your equipment consultant (and I do urge you to have one), and he should be a specialist in this field. He should be paid for this service. Expert knowledge is required: it is a time-consuming task to study your requirements and to prepare specifications correctly.

We have noticed that some specifications, prepared recently, include a bidders' list from whom bids will be accepted. Before bids are requested, the buyer decides who shall bid on his equipment. This is a good development and we think it should be used more frequently.

HOYT GALVIN: Specifications for library furniture and equipment are written instructions describing, distinguishing, and limiting the exact furniture and equipment, including workmanship and installation, desired for a particular library.

These specifications should be written by the librarian, the architect, or the specialist responsible for furnishing and equipping the library.

The writing of specifications, however, is the last step in the selection of the furniture and equipment. The specification writing should follow layouts of furniture prepared as the building plans are developed. Early preparation of layouts permits adjusting the building plans, where advisable, to fit the furniture and equipment needs.

Writing the specifications should also follow the selection or design of each piece of furniture and equipment needed and the selection of all woods and fabrics. Also, the specifications should follow preparation and approval of the budget for furniture and equipment. This budget should be developed and tested against tentative price data as the furniture is selected.

Thus, being the last step following layouts, selection, design, color selection, and budget analysis, the specifications are written to delineate the furniture and equipment requirements as a result of the previous steps.

The specifications should be written in simple and clear language, be as brief as possible, and be fair to the contractor or contractors who will bid to supply the furniture and equipment according to the specifications. At least two copies of the specifications should be supplied to each prospective bidder—one copy for return with bid notations, and one copy for the bidder's files.

Furniture and equipment specifications differ somewhat from those for construction. The latter specifications complement working drawings for a building. In most cases, furniture and equipment specifications will describe the required products and workmanship verbally when the products sought are commonly available and when a particular brand and/or manufacturer's model number can be indicated. Where special designs have been created for the particular job, detailed drawings of the relevant items should be included with the specifications.

The specifications should be divided logically into sections. Normally, the first section will be an invitation to bidders giving the date, hour, and place for the final receipt and opening of bids. In this invitation section, any pertinent bid bond requirements should be specified.

The second section will usually state the general conditions relating to delivery, uncrating, installation, and disposal of crating. In this section, the eligibility of bidders should be outlined, and the requirements regarding alternate bids. If samples are to be required, this should be specified in the general conditions. Although it is advisable to have the library's attorney check specifications, it is especially important for the attorney to check the general conditions to make sure that the library is adequately protected, and that the specifications fulfill all legal requirements applying in the particular community.

A third section, which might be called "general specifications," covers such items as the construction required for all table tops and the architectural specifications for steel book stack installations. Steel book stack manufacturers provide architectural specifications for stacks. A particular manufacturer's specifications can be used, or better still, selection can be made of those features of steel stack specifications which are of special interest for the particular installation.

The main section of the document will be the schedule of equipment which describes each item, arranged so the bidder can give both unit prices and the composite prices where several pieces of one item are indicated.

The general purpose of the specifications will be to ensure the procurement of functional, durable, and beautiful furniture. To this end, specific manufacturer's model numbers will usually be shown, followed by the term "or equal." The "or equal" term is necessary to allow other manufacturers to bid, and where "alternates," e.g., substitutions of certain items, become a factor in the bidding.

Due consideration should be given to proposed alternates to make certain that they meet the specifications for function, durability, and beauty. Appraising an alternate for function is probably the easiest of these judgments to make. Evaluating durability is more difficult unless a sample is dismantled. Even more difficult is the question of beauty. Beauty is a matter of taste—difficult to define, but necessary to achieve the over-all objective. Consequently, the general conditions should be clear with respect to design; a phrase such as the following should be included:

"In considering items offered as alternates, qualities of design and appearance will bear equal weight with those of function, durability, and workmanship."

Such a phrase will help to protect the library against the prospect of accepting an unattractive and hence inappropriate piece of furniture—however functionally satisfactory and durable, as an alternate—that is, something not in keeping with the desired design and appearance nor with the architectural design of the building.

Where furniture items are to be covered with fabric, the manufacturer and fabric number of the fabric to be used should be a part of the description. The form might be something like the following:

> "Four-seater sofa, 94 inches long, oiled walnut base, foam rubber cushions and back. To be upholstered in naughahyde #1918 JE, beige DeLuxe Cordero, Monarch #C-1610, or equivalent."

Personally, I recommend that the bidders be required to give a specific unit price for each item. The general conditions should state that quantities are approximate. Then, if all of the bids should exceed the budget, the quantities can be reduced accordingly, so that the total cost comes within the budget figure. Some bidders resist item-for-item bidding and attempt to provide only a total price, which leaves the library in the position of being forced to choose between buying all or nothing from a given bidder. The bidder's argument is that by bidding the job as a whole, he can offer a discount on the assumption that he will get the entire job. In my opinion, the bidder can do both. He can give unit prices for each item specified, and he can give a total price with a discount if he is the successful bidder for the entire job.

Having been given unit prices, the library has the option of dividing the orders with each item going to its respective low bidder. Many bidders will not bid the entire layout but some of the specialty bidders will give excellent prices for specifications. To give proper consideration to such limited bidding, one must have unit price bids on all items.

Without item-for-item bids, the library is in a poor negotiating position if the bids are too high; with unit prices, in some instances, the bids will be lower than anticipated and quantities of individual items can be raised to more closely fulfill the library's needs—all of which can be calculated more accurately to fit the limitations of the budget.

MR. GELLER: I think it should be mentioned at this point that the American Library Association does not sponsor any particular product. These men were chosen because of their experience. I think, though, before opening this to questions, I would like to ask Mr. Syren to comment on specifications for wood shelving.

MR. SYREN: First, in my opinion—and I am not speaking for anyone else—wood shelving should be sectional. In other words, if you want to take a section or two sections down, you can do so, and, so far as space is concerned you won't be penalized. If you want to change the location of various sections, you can take them down and move them to different places. This should apply both to wall shelving and to double-faced shelving in reading rooms—especially, I think, where wall shelving is used. We don't recommend it generally, because the cost of wood shelving at the wall is a little higher than double-faced.

Basically, we believe that a wood upright should be all wood and have no metal of any kind inserted for the holding of book shelves. On occasion, I have seen—when this type work has not been done by such good manufacturers as Sjostrom—that the metal parts had not been recessed far enough; they acted as obstructions to the books when they were placed against the upright. I have seen rusting of the metal strips. Therefore, we believe that a wood upright should be bored for holes and pins used for adjustment.

All uprights should have an adjustment of one inch. Less than that, I think, is unnecessary, because we find (and, although Mr. Metcalf will probably say it is high time we thought of making some changes, we have made wood shelving for seventy-five years) that a one-inch adjustment has served very well through these years, and I haven't seen any reason for changing it.

The intermediate upright, we feel, should be made of solid wood. We agree with Sjostrom. However, the way to achieve beauty in end panels—and, when you have double-faced shelving in a reading room, the end panel is the first thing you see as you walk through the door—is through veneer, not rotary cut sliced veneer. Sliced veneer costs more than the rotary cut veneer and, we believe, has greater beauty, but there is no difference so far as utility is concerned.

The top and base should be bolted in place. The question of whether to have a flat or sloping bottom shelf, I think, is a matter of choice. We find that in reference desks, where you have 42 inches or even 60 inches, you do lose a little space with a sloping shelf. If you use a sloping shelf, there should be some type of abrasive—either cork or rubber—on the shelf to keep the books from slipping backward.

Normally, when shelving is to be used against the walls, it should be supplied with backs. These backs can be installed in a color which will blend in with your equipment; they will serve as an attractive area against the wall and act as a good background for the books. In double-faced shelving, you should have some sway braces, unless you install a back. There is no way that we can construct wood shelving with such bracing as that used in steel book stacks, in which we can eliminate the sway braces. The shelves should be made of solid stock. The strips should be narrow and glued together with electronic glue so that you do not have any warping, chipping, or cracking where the boards are put together. The front of the shelf should be rounded slightly, both at the top and the bottom, so that as books strike the edge of the shelf they are not likely to splinter the shelf itself over a period of time.

Finally, we believe it is advisable for the shelf to have a slight groove underneath for a label holder. I believe that is about all I can say about wood shelving.

MR. GELLER: Thank you, Mr. Syren. Maybe I should give your competitors equal time. They will probably ask for it. Mr. Lombard, do you have a rebuttal to make to that pitch?

MR. LOMBARD: Well, I never have favored wood shelving in a library.

MR. GELLER: Would you like to comment?

MR. LOMBARD: I can understand Mr. Syren's suggestion for introducing a colored back into the wood book stack. It is also an improvement.

If I were making the selection—and I am quite certain I would specify on this—I would specify metal; and with the variety of colors available, it seems to me that metal is more appropriate than wood. That is my opinion. That thought has been carried out in quite a number of libraries; the people concerned were satisfied and continue to be satisfied. So, for reading rooms, reference rooms, rare book rooms, and that sort of thing, I recommend that steel book stacks be considered.

MR. GELLER: I should remind the audience again that the American Library Association is not sponsoring any particular product.

QUESTION (directed to all members of the panel): I wonder how closely the bidder should be held to specific delivery dates and should money penalties be imposed for non-delivery or inappropriate installations by a specific date?

MR. SYREN: I believe that to be a good question. We have been late in delivery lots of times. We have been penalized, too, but there are two sides to the question. If you purchasers want us to deliver the material, we will try to do it; however, if we deliver in advance, would you pay us a premium? So, it should be a two-way street.

I think that if your project is such that it is of great importance to have a building ready, for, say, a special meeting, you are justified in imposing a penalty. On the other hand, we find that, time after time, we have exerted great pressure to have equipment delivered by a certain date and then the equipment is simply stored for several months awaiting completion of the building. We are not paid for such extra effort. In many cases, payment for the equipment is delayed because it has not been installed.

MR. LOMBARD: Regarding a penalty for non-delivery, I would suggest first that orders be placed early enough so that the delivery can be made in a reasonable time. Nobody likes to pay a penalty and the manufacturers, in their pricing, do not assume that there will be a penalty. When the profit is taken away—or part of it—the situation is not conducive to the best public relations. The manufacturer names his price, and he gives you a shipping date—sometimes a delivery date—and he plans his production accordingly. He is interested in trading those steel book stacks, for example, for dollars. I know that Art Metal likes to trade steel book stacks for dollars; we are interested in turnover of equipment, so we don't look with favor on these penalty clauses. I don't believe there is much to be gained.

MR. GELLER: Mr. Galvin, would you like to take your turn?

MR. GALVIN: I can't help recalling an experience I have just had that is related to what Mr. Syren has said. We had a delivery schedule on equipment for a new branch library, a small building (4,000 square feet), just within this last month. Everything went wrong so far as the construction was concerned. It was a combination of things that really weren't anyone's fault in particular. The power company and the telephone company didn't make their installations until a month after the contract date and so forth. However, we had furniture stored there because the contractors delivered it when we asked them to. In such a situation, I would have been embarrassed to have inflicted a penalty clause. If you are dealing with responsible bidders, such clauses are probably not necessary. There are bound to be exceptions when completion of the installations is really critical. Of course, and this applies to all of us, we want our library to be finished; we have been waiting for a long time. Those days go by or that week, or month, or two months—in a large building, sometimes six months—and it seems as if we won't live to see the completion of it. But once the building is completed and you have moved in and you are worried about the shakedown cruise, those days of delay begin to fade from your memory. In most cases, I don't think penalty clauses are necessary.

There is one more thing I wanted to say. I think you ought to have your furniture ordered six months before you want it delivered. Now, that is playing fair with your manufacturer. Don't wait until the last minute. Plan your furniture for your building as the plans for the building are being made. When the architect is completing the working drawings on certain buildings, buildings that will be completed in a six-month period, it is best to have the specifications on furnishings completed at the same time. With a large building, this is another matter. If a year and a half or five years are required for construction, large orders for equipment should be submitted perhaps eight or nine months prior to the completion date.

QUESTION: In regard to wood shelving or double faced shelving, what should the backs be made of? Is masonite as good as plywood or is it not as good as plywood?

MR. SYREN: I think you have two things to consider. If you wish to paint the backs, masonite serves every purpose that wood can, because you are covering up the surface. Masonite does not shrink. It does not absorb moisture to any extent. There are times when you would prefer the beauty of natural wood for that back, and, in that case, I think the wood back serves the purpose much better. But, so far as holding the unit and dividing it from one side to the other, either will serve the purpose: you can take your choice.

QUESTION (directed to Mr. Syren): The public institution which writes rigid specifications is frequently accused of having written *closed* specifications. Now, to get around this accusation, the public institution sometimes invites bidders to offer substitutes. Then, if we accept a substitute, we are criticized for lack of faith in our specifications. As a public institution, we don't like criticism; we like good public relations. Have you any suggestions?

MR. SYREN: As I tried to point out, we recognize that when public money is involved, you have a special situation. When you decide that a particular bid is not the one you want and that someone else's is a more responsible bid, you must be prepared to support your position with facts.

There are several relevant factors but, you should do as we suggested; that is, call for samples. It is not enough to say, "We will accept substitute bids." In justice to the bidder, and to the municipality concerned, you should be more specific. There are enough good, responsible bidding manufacturers in steel and wood from whom you can get a description better than that expressed simply by "just a substitute."

Then, if you require the submission of samples such as could be tested for you by a laboratory, your position would be secure. Am I answering the question?

THE SPEAKER FROM THE FLOOR: Not quite. Obviously, if you permit substitutions, you are going to ask for samples. It is going to have to be demonstrated that what is offered is fully acceptable, but that doesn't relieve you of criticism. After all, you have written rather rigid specifications. There is some expense entailed in meeting those specifications and, then, you must attempt to be completely open so that everybody has an opportunity to bid. The situation becomes particularly violent at the local level when you have a number of bidders trying to get the business. They say, "Well, look. You wrote rigid specifications and now you give the order to somebody who didn't follow them." And yet, that bidder may have a superior product as demonstrated by your sample.

The point I am making is simply that, in this kind of a situation, you are in for a good deal of criticism, and on the local level this becomes pretty tough.

MR. SYREN: I can appreciate what you are up against, but I still believe that if you had those samples inspected by some laboratory, and you had the laboratory report available, and you permitted the competitor who was not given the award to see exactly what was being supplied, you might soften that criticism a little bit. I still hold that you should write good, stiff specifications and stick to them, because there are enough good manufacturers to obtain satisfactory bids.

Normally, I think three bids are required and will serve the purpose, every purpose. But there may be local conditions in which this may not apply. I know that we can't say that this rule is universally applicable; we are just trying to help wherever we can.

QUESTION: Mr. Galvin, please. In outfitting the whole library, should all of the equipment be bid and let in one contract, or several? If more than one, what would be the ideal breakdown of contracts?

MR. GALVIN: It certainly simplifies life for the librarian if the lowest responsible bidder can supply all of the equipment. There is no doubt about it. On the other hand, as I said earlier, I don't think that you should eliminate what I called "specialty manufacturers," manufacturers who might produce only a few of the items on your entire equipment list. Perhaps nothing is involved except sand urns, ash trays, and planters. But those manufacturers should have a chance to bid anyway. And then, if one of them is the low bidder and if you decide that they meet the specifications, you must start letting more contracts. It is a somewhat greater nuisance to the library. But our job is to get the best we can for our institution for the money, and if it means several contracts and worrying about deliveries from several manufacturers or jobbers, why, that is what we are paid to do. Our architects or our consultants may be paid to handle this problem and, of course, the simplest course is to have only one supplier, if he can supply all of the equipment. I don't think that it necessarily will work out to the best dollar advantage.

MR. GELLER: We have a rebuttal coming from Mr. Syren.

MR. SYREN: This is not as much a rebuttal as it is a suggestion. When the list of equipment is being prepared, I think that for any library there are categories of equipment that should be grouped together. The technical equipment—such as charging desks, catalog cases, reference tables, and perhaps the tables and the chairs—should fall under one classification. Normally, the library equipment people do not build upholstered equipment, such as davenports, club chairs, and so forth. Sometimes it is advantageous for a local library to have that type of equipment listed in a separate category. This would provide an opportunity for the library equipment manufacturer to bid on it if he wished to. If it is established in the beginning, that is, that urns or clocks or various other things that we don't make are listed separately, I don't think that you would be penalized.

I would like to add something else: Occasionally, the librarian will get a budget of $50,000.00 for equipment for the library. In the meantime, prices have gone up or gone down, and he doesn't want to make changes. Rather than total itemizing of an entire bid, I would suggest that you include reference to the possible deduction of amounts for certain items which might be eliminated in order to provide for some flexibility.

QUESTION (to Mr. Galvin): Recently I attended a meeting of the procurement officers for the federal government, and one of the main subjects of discussion was the "or equal" clause. In your talk, you mentioned that you felt that a product "or equal" was a good way to specify. The general consensus of this group, and I agree with their opinion very strongly, was that this is a rather vague way of describing a product. I think most of the manufacturers—at least I can speak for the one that I represent—feel that a definitive specification places less personal judgment in the hands of the buying officer than would be desirable. If, for example, you say this should be red "or equal," and somebody offers you blue, and you happen to like blue, it is fine, but, if you don't like blue, it is not equal. If you had a real yardstick for a product against which you can measure it, I think you have a little better way of evaluating it. As it is, you mention "artistic evaluation." This, of course, is something extremely difficult to be precise about but, wherever we *can* use a definitive yardstick, wouldn't we be a lot better off to try to do just that?

MR. GALVIN: Well, I am practically in the position of receiving that as information rather than trying to answer it as a question, because I like the idea. Your local laws—and they will perhaps vary somewhat from area to area and state to state—may have some bearing on the question. I am certainly not an expert on the laws of the United States and the bidding in the various states of the union. So, I think it is a matter that you should take up with your local attorney. I would say this: if you can specify one item—and that is the item you want and you can get three bidders for it—you are in an excellent position.

QUESTION: My question involves this: The library at present has, let's say, 40,000 volumes on its shelves. Let's say it is in a store location, and it is going to move into a final building that will hold 100,000 volumes. Would you plan the layout as it should be when it will have 100,000 volumes and give out bids on that basis, or would you give out bids for a little over 40,000 and keep adding as you go along?

MR. GALVIN: Any attempt I am going to make to answer that will be based on the assumption that you've got the money. If you don't have the money, and you can't get the money, why, I believe the alternative is obvious; that is, that you get all the shelving you can. From 40,000 to 100,000 is really not such extraordinary growth, and it is amazing how fast those shelves will fill up. It shouldn't create the temptation for us to keep junk on the shelf, to be sure, but I have a suspicion that your 40,000 volumes are over-crowded and that your pages are having a tough time. Sixty to 66 percent of capacity in a public library type of operation, you see, makes it a browsing type of setting. This wouldn't apply to a research library, with compact storage and that sort of thing, but, in your case, you don't want your shelves too full, anyway. So, if you have the money, go ahead and get the shelves, because that money may disappear and you may have trouble getting it at another time. The psychology of getting money out of the community for building continues to amaze me. I have about concluded (and I have no scientific background for this) that it takes on the average about 1.9 bond issue elections to have a successful one. Many communities have to have two elections and some of them have three; others are fortunate to succeed with only one. I have not experienced the last. I have very little faith any more in the types of campaigns ordinarily used in raising bond issues. I think it may have to do with a great deal of psychologically complicated modifications in attitudes which occur between the announcement of a proposed election date and the time the election comes off. Many factors are working: other elections going on; stories in the newspapers; what the people are interested in; how the stock market is doing; how tax collections have been proceeding; how bond issues were passed in a neighboring community for schools. I can tell you this: If you have the money, I would recommend that you put the stacks in.

QUESTION: I think I can state this without the benefit of the microphone. It is just an interesting sidelight to the question of shelving and economy and that of having money or no money. If you knew that you could not get all of the money now but that you were to get some of it later, and also that later, you might have to accept a different kind of shelving, then what I would suggest is that you could perhaps consider using the money that you get now to put in your studs minus your shelves and then buy your shelves later. At least you have the satisfaction of having the complete type of shelving that you would want.

QUESTION: I wonder if I could have two manufacturers' representatives comment on the growing tendency to require local bidders to be granted a latitude—say, one percent, 5 percent, 10 percent—on the money bid.

MR. GELLER: Would the manufacturers' representatives comment on that? Mr. Lombard, would you care to start off?

MR. LOMBARD: I think that is a matter for the community to decide for itself. I think that if I were a dealer in a town, I would appreciate that option.

But I am not certain that I would be justified in feeling that way, because I wouldn't be sure that I could make a contribution that would be worth that one percent. There is this, however, to be said for the local dealer. He invariably is a responsible citizen. He pays taxes. He is available there in case anything goes wrong. If a complaint is to be made, he is no further away than your telephone. I believe if I were bidding on the job where the dealer received a one percent preference, I would bid through the local dealer and let him have his one percent.

MR. GELLER: Mr. Syren.

MR. SYREN: Well, this came as a small shock to me. I didn't realize that communities were reaching that stage. I do know that the state of Wisconsin has had a law of that kind for many years. I know that it works to the disadvantage of some companies in Wisconsin when they bid in other states. So, I could see that a local option of that kind might affect the non-local dealer if he were bidding in a particular community—if he were trying to sell some stationery or a typewriter or a filing cabinet—and he had to give the preference to other dealers.

I wasn't aware that that was a growing tendency, but I think I would do the same as Mr. Lombard did; I would try and find a local dealer.

MR. GELLER: Another question?

QUESTION: I would like to ask any member of the panel, or all of them: is there a preference for having stacks installed as equipment later as against making stack installation a part of the building contract?

MR. LOMBARD: Why, I would say that whether the book stacks should be included as a part of the general contract or let as a separate contract would depend upon the type of book stacks to be installed, and their relation to the building. For instance, with regard to multi-tier book stacks, it might be considered good practice to include them with the general contract. We have had very pleasant relations with general contractors whose contracts included the book stacks. And I think the owner, where that arrangement is specified, is motivated by the desire to centralize the responsibility in one person—the general contractor. However, of late, there appear to be fewer general contracts which include book stacks than was the practice of several years ago.

MR. GELLER: Mr. Syren, would you comment on that and also perhaps cover the differential of the respective contractors' profit on this thing? Is there a differential?

MR. SYREN: I think Mr. Lombard is right in that perhaps the only thing that could be considered in the general contract would be a multi-tier stack. The one thing I think you might lose if you put in stacks with the general contract is control. Sometimes a specification can be written so that a lump sum is allowed for a given contract and the authority for awarding of that contract to the bidder should be in the hands of the library board or whoever happens to be the purchasing authority. We do know that general contractors are not going to handle a fifty- or a hundred-thousand-dollar contract without some compensation. It is only logical that he should be expected to get some compensation. As a result, I believe that it may cost you slightly more to have it handled in a general contract way than other ways. But for anything beyond that—such as free-standing stacks, or wood shelving, or a charging desk or other things to be placed out on the floor—I can see no advantages in placing them through a general contractor.

MR. GELLER: Thank you. Any more questions? I would like to have some comments or questions from the audience based on the experience they have been having with purchasing agencies. We have been skirting this subject, and I don't think there is a purchasing agent in the audience to defend himself; however, perhaps we could get into this.

COMMENT FROM THE FLOOR: I would like to make some observations on problems which come up when you have the stacks and certain other facilities installed by people other than the general contractors and architects. In most of our public building programs, we usually find ourselves running out of time. We must bring other contractors in—for example, a supplier contractor—earlier than might be preferred. These other contractors are going to be in the building along with the general contractor and the problem arises as to how the work is to be coordinated. Someone must assume the responsibility for saying that the building is acceptable before it is ready for occupancy. Basically, the general contractor is responsible while his work continues, but when other contractors enter—such as suppliers—there is the possibility of damage to the finished portions. Then the municipality must assume the responsibility of protecting the property against damage, theft, and so forth. A general contractor, we have found from our experience, realizes that he has a great many problems in this respect, and he would prefer to stay out of them.

Moreover, if you include stacks, for example, in your request for alternate bids, in many cases, your over-all cost will not be increased. I have found that, in many projects, the final costs as related to six out of eight bids will be no higher than the original quotes.

Of course, it is very important that the architect—or whoever else is supervising the work—make sure that the specifications are met. There are contractors who, given a free hand, will try to peddle bids on their own, or will try to get away with lower specifications and pocket the difference in cost.

The main point I would like to mention here is that problems come up, not simply because of timing and the various people who want to get into the job, but because of other reasons. For example, the man who happens to be mayor during the period of the project wants it completed during his term. Thus, pressure is exerted which might produce overlapping in various parts of the work.

QUESTION: I would like to bring up the subject of labor unions. In our last branch installation, the manufacturer of the circulating desk, a union agent, dropped by and stopped the work because the circulation desk wasn't put together by a member of the local union. Are there any other examples of that kind of thing?

QUESTION: That brings up a second question. If a particular area is subject to picketing, would you include in your specifications the requirement that the work be done by union labor?

RESPONSE (from the floor): In some places, the laws require that labor regulations be complied with. I would not include the statement in the specifications unless it was required by law. It is still the case that, when you encounter a situation like that, the successful bidder is responsible for getting the desk in. Confidentially, what I would do, is to tell him to come back Sunday night when nobody is there and put it up.

MR. GELLER: Any more questions?

COMMENT: I would like to comment briefly on the matter of purchasing agents. It seems to me that, in principle and in theory, the idea of having a purchasing agent to serve a community is a very good one. The real problem seems to arise in the amount of information available to the purchasing agent about library equipment and how he may best get that information.

MR. GELLER: Do any of you gentlemen wish to comment?

MR. SYREN: I think that a purchasing agent is a legitimate officer of any city. And if he has been delegated the authority to do the buying, then he should have information. However, I think it is up to the librarian (if you are talking about library equipment) to consult with the purchasing agent so he will be informed about the type of equipment the librarian wants, and so he will know something about the operation of a library. I don't think you should simply take a set of specifications or a list of equipment to the purchasing agent and say, "This is what I want to buy." He might have other ideas. I think that, if you bring him into your confidence, describe the job you are doing and explain why you want to do certain things, he will be a bit more understanding of your problem. I think that, if your representatives or consultant—whoever is working with you on the contract—can meet with the purchasing agent and do a little selling, your lot will be made quite a bit easier.

MR. GALVIN: Generally, I believe that purchasing agents are made out of the same kind of stuff as college presidents, library boards of trustees, college trustees, city managers, county commission chairmen, and so on. Occasionally, one of them will be quite difficult to deal with, but that presents a challenge for you. What Mr. Syren has said is correct; you've got to do not only a public relations job, but you must also make the purchasing agent feel that he is a part of your team; make him feel that the library is vital to the community and that having good materials in the library is important. If he can understand this, then he will join your team as will the city manager or the college president. It is partly a matter of public relations, if you will permit the use of that term.

MR. GELLER: The problem also goes back to the writing of the specifications; then standing by them, and selling the purchasing agent on them. We are educators, too.

• 4 •

Equipment and Methods in Catalog Card Reproduction

In the Friday morning program, Forrest Carhart introduced Joseph Treyz, Head, New Campuses Program of the University of California, who delivered a paper on equipment and methods in catalog card reproduction.

JOSEPH H. TREYZ: This paper is a general introduction to catalog card reproduction. It is also intended to serve as an interim report until the recent study conducted by the Library Technology Project is published.

Card reproduction is a small part of the broader fields of information dispersal and duplication. It is also one of the least standardized aspects of library technology. Information and facilities for evaluating the different processes are rare. Articles in library journals or technical publications ordinarily consider only one process in an individual library. If a comparison is made, it is usually based on an inferior method that had forced the library to consider a new method.

Important considerations in the reproduction of catalog cards are the following:

1. The information on catalog cards is expensive to assemble.
2. This information is essential and should be reproduced on all cards.
3. Catalog cards are produced in large quantities; i.e., library requirements range from one thousand to five hundred thousand cards a year.
4. Cards must be durable: The stock must be sturdy and the ink permanent.
5. Little variation in card size can be tolerated.
6. Except for two cards in a set, all cards have their information arranged differently and, in most cases, must be handled individually.
7. Cards should be added to the catalog immediately. Delay usually involves the insertion of temporary records, an expensive procedure.
8. Cards must be reproduced in all languages and all alphabets.

Because no two libraries' card needs are the same, no single reproduction process, method, or piece of equipment can meet the needs of all libraries.

Printed cards

Libraries may either buy printed cards or reproduce their own. Printed cards can be obtained complete with headings and call numbers from the H. W. Wilson Co., or from a cataloging service such as Alanar. More often, however, they are purchased from the H. W. Wilson Co. or the Library of Congress in sets of unit cards, and the library must add the call numbers and headings.

It is important to remember that when the library purchases printed cards it is really purchasing cataloging information and, in the process, receives the necessary catalog cards. Only when another means of obtaining Library of Congress cataloging information is available—for example, LC proofsheets, the printed *National Union Catalog,* or *American Book Publishing Record*—is it possible for a library to consider reproducing its own cards. This is practical only for medium-size and large libraries. It is too expensive for a small library to subscribe to proofsheets or to search for the entry in *American Book Publishing Record* and then proceed to reproduce a set or sets of cards.

For small libraries, whose catalogs have been built with complete cards (e.g., Wilson), that method of obtaining cards is the most economical. Libraries, however, which have not used the complete cards in the past may find that making the changes necessary to fit such cards into their catalogs is more expensive than having their own call numbers and headings typed on LC or Wilson unit cards.

It is quite common to hear talk today of accepting Library of Congress cards as they stand. Librarians should be warned against this dangerous practice. Continued blind acceptance of printed cards almost guarantees the destruction of a catalog. The catalog is a tool that must change with every change in modern society. New subjects are created daily, and old ones are called by new names. Both the Library of Congress and Dewey classifications change to keep pace with new developments and expanding fields. All of these directly affect the catalog, which must record and absorb these changes. If it does not, the catalog is an inconsistent, undependable, and inaccurate tool. Thus, every purchased (printed) card that goes into a catalog should be checked for main entry, added entries, subject headings, and classification.

Typewriters

All libraries must type some cards. This is true for the large library with elaborate card reproduction processes as well as for the small library.

Since differences among the better-known makes of typewriters are usually insignificant, the choice is a matter of operator preference or taste and might be compared with the choice between a Ford, a Chevrolet, and a Plymouth. However, machines should be tested for card work before they are purchased. Some standard models may need card platens so that the top and bottom lines can be clearly and neatly typed. Cataloging also requires special keys; for example, brackets, a script ℓ, accents, etc. If a library processes large numbers of foreign titles, other special keys are desirable.

An electric typewriter should be purchased if the machine will be used extensively. Although costing about $200 more than a standard model, an electric machine is 20 percent faster with straight typing and 15 percent faster with card work. The copy is also clearer. Electric typewriters are especially useful for typing stencils or masters because the keys strike with a uniform pressure and produce sharper lines.

With proportional-spacing electric typewriters, it is possible to place 10 percent more information on a catalog card. This same feature, however, makes it difficult to correct errors and more than offsets the advantages of these machines. Moreover, such machines cost 50 percent more than standard electrics and for this reason are not recommended for card work.

Small type faces such as IBM text type are available on most typewriters. These faces allow for the insertion of 35 to 55 percent more material on a card than is possible with the use of elite type, and 40 to 65 percent more material than with pica type. Some libraries, whose detailed cataloging information occasionally requires a second card, use this type size. However, once these cards are in the catalog, they are more difficult to read, and the more such cards make up the catalog, the more difficult the catalog is to use. The small typefaces, therefore, are not recommended for catalog cards.

A Vari-Typer is a versatile machine that has capacity for two sizes of type or a double alphabet and one can, for example, put Russian or Greek characters on these machines. A Vari-Typer costs about $1,000, however, and is slower to operate than standard typewriters.*

Most libraries that type all of their cards waste time and money. The typing of cards is expensive, as is the proofreading of every card. When a library types 4,000 individual cards a year (approximately 1,000 titles), it is close to the point where investing in a duplicator as a means of reproducing cards would be more economical.

Not all cards, however, should be mechanically reproduced. If only two or three cards are needed, they should be typed. The point where one should begin reproducing cards mechanically is elusive and variable. It depends primarily upon the length of cataloging copy. A set with considerable information on the catalog card (that is, seven or eight lines) should be reproduced when four or more cards are needed. Cards with a small amount of information should be reproduced when six or more cards are needed. University libraries usually duplicate their cards at four or five; public libraries at six or seven.

Stencil duplicators—post card size

Small stencil duplicators look very much like toys and, in most cases, were designed for the inexpensive reproduction of post card notices. Fortunately, the catalog card is a similar size, and many of these machines have been used advantageously for catalog card reproduction. All such devices work on the same principle. A single-card stencil is perforated with a standard typewriter. Stencils are placed on the machine and, as pressure is applied either by pressing down or turning a drum, ink is forced onto the card stock through the perforations.

The Print-O-Matic is one of these machines. It is about the size of an ordinary breadbox and sells for approximately $20. A central drum contains ink which feeds the ink pad around it. On some small duplicators, the ink does not distribute itself well, and it is often necessary to brush the ink over the pad each time a stencil is run. Even then the ink may not come through the stencil evenly, and a number of waste cards must be run off first. It is also difficult to adjust the stencil on the machine to get exact registration. As might be expected, this can be a fairly messy operation. It does, however, save money.

The Card-Master costs about $45. The stencil is typed in the same way but, in this case, fits on a roller-applicator which has a covered surface and looks like a small, hand, desk blotter. Ink is poured into a reservoir which dampens a pad over the curved surface, or it may be brushed on the outside of the pad. After the stencil is placed on the machine, it can be rolled across paper towels or similar material until a good image is formed. This eliminates wasting card stock. One hundred or more cards can be run from a single stencil.

Another important machine in this category is the Chiang Catalog Card Duplicator. This device costs about $54 and is approximately the same size as the others. The Chiang is one of the few machines designed specifically for reproducing cards. The first model was not very successful. However, in 1961, Mr. Chiang came out with a redesigned second model. Reports indicate that it eliminates many of the troubles of the earlier one.** In the second model, cards are manually inserted into a small box. Ink is poured into the box and the card is produced by a push-and-pull method. The first few cards may be wasted.

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*The new IBM Selectric typewriter should meet all of the various typing needs of a library in areas in which library-keyed balls are available. These balls are easy to put on the typewriter and will provide not only different sizes and kinds of type, but as many non-Roman alphabets as needed.

**A third model is now on the market.

When more than six sets of cards are needed for one title on any of these machines, it pays to type the longest added entry at the top of the stencil. Added entry cards are produced first, the heading is then blocked off with Scotch tape and the necessary unit cards run off.

All of these small machines have two major drawbacks: First, they are slow—the cards must be hand-fed into the machines and often individually removed. Second, the ink dries slowly. Cards often must be laid aside individually and allowed to dry, or blotting paper must be inserted between each card as it comes off the machine. Cards laid aside often take a day or two to dry, especially in humid weather. Some libraries expedite this by inserting the cards between newspapers or the pages of an old telephone book. Improved, fast-drying inks are on the market, and are usually interchangeable in these machines. Librarians should try several to find the one that works best in their machine. It is also important to try different stencils. These also vary in quality; some are more satisfactory than others.

The advantages of these small duplicators are those of any automatic process. They are faster and less expensive than the process of typing and proofreading each card. In addition, the investment is small.

When these small machines cannot handle the required volume of card reproduction, it is time to switch to a full-size stencil duplicator.

Stencil duplicators—full-size

Prices for this equipment range from $200 to $800. The A. B. Dick Company, the Gestetner Corporation, and the Rex-Rotary Distributing Corp. are among the better known manufacturers. Such machines utilize the same principles as the smaller stencil machines, but are better built and faster. They offer the choice of creating stencils by typing or electronic scanning, the use of fluid or paste inks, or manual or electric operation.

The electronic scanner is a recent development. It is about as large as an electric typewriter, has a number of dials and two cylinders. Information to be copied is placed around one cylinder. Around the other is placed a stencil. As an electronic eye scans the copy, corresponding holes are burned into the stencil, thus producing an exact image of the card copy. The process is slow and it takes seven minutes to scan a ten-inch area. Although it is possible to get six catalog cards into this area, this is only slightly more rapid than typing six cards onto a stencil. Moreover, the image is somewhat fuzzy and the machine is quite expensive—about $2,000. If such a machine were already available for use by a library, it should be considered for special rental or purchase.

Thus typing is still the best method of producing a stencil. Stencils are available for typing singly or in strips of two or four. Some have guide lines marked on them for catalog card typing and contain carbon-impregnated buffers and backing sheets for easy proofreading. Fast-drying correction fluid permits rapid, easy corrections.

The machines using a paste ink are slightly less expensive and are simpler to use. However, paste ink dries slowly on cards. Some large machines have inter-leaving attachments. This gadget automatically drops a blotting card between each catalog card as it comes out of the duplicator. When several sets of cards have been run off, they are removed from the inter-leaving attachment. They are quite satisfactory, but they do slow down card production. Another disadvantage is that paste ink machines may produce waste cards each time a stencil is run off.

Fluid-ink machines are better for longer runs and higher speeds. They require more care, but they produce fewer waste cards. Fast-drying inks eliminate problems of drying the cards. One can do sheet work on these machines but, for best results, one machine should be used exclusively for card work. The three- by five-inch area the card stencil uses is often saturated with ink, while the rest of the drum is not. This makes it difficult to do good sheet work.

To control the ink on these drums, it is often necessary to place a mask over the ink pad with the three- by five-inch area cut out. Normally, this mask is good for only one day's production.

One company, the Fichimprim Company, has adapted a standard stencil machine, the Rex-Rotary M4 Duplicator, for card reproduction. The silk screen of the duplicator is permanetly masked so that ink flows only through the area under the card stencil. The pressure rolls have also been modified so that they are effective only over an area four and one-half inches wide. A special clamp has been added which permits the rapid placement and removal of the stencil. Unfortunately, at the time of the Library Technology Project's Study, this machine was too new to permit an appraisal of long-term performance.

When more than 15,000 stencils (about 85,000 cards) are used in a year, it is very likely more economical to use an offset machine. These figures are, of course, approximations. A particular library's decision to change its card reproduction process will depend upon the average length of its cataloging copy, the average number of cards in its sets, the average number of sets per title, the cost of the equipment, and the average hourly wage.

Offset duplicators

Offset duplication, i.e., multilithing, is most satisfactory for large libraries. Prices of these machines range from $1,300 to $5,000. In most libraries, offset duplicators are successfully used for other work besides running card stock. Such added use of the machine may be necessary to justify the expense of the machine's purchase.

Offset machines are larger and faster than stencil machines. Small models are a little bigger than a card table. The larger models are the size of a telephone booth placed on its side. They allow several sets of cards to be produced at once. Many libraries run off sets of four, six, or eight. Card stock may have the holes pre-drilled or holes may be drilled after the card stock has been cut to size.

The basic principle here is different from stencil duplication. It is based on the fact that oil and water do not mix. After the master is created, the multilithing starts by covering the master with a water-solution. Once the master has been placed on the machine, and the machine started, only the carbon-impregnated typewritten characters attract the oil-based ink. This ink is transferred to a roller or blanket that, in turn, transfers it to card stock as the stock comes into contact with this roller. After each master has been run, the roller must be wiped clean before another can be run.

An especially important consideration in purchasing an offset machine is the availability of service, ordinarily furnished by the equipment supplier. The machines are delicate and complicated and often require considerable adjustment and attention.

When more than eight sets of one title are being multilithed, it will pay to use a heading overlay master for each added entry after the main entry and shelf cards are run off. A small strip of a master with an added entry typed on it is placed over the original master in the same position as an added entry would be, and the completed added entry card is run off. This method will produce a line across the cards at the edge of the overlay, but this can be prevented with the use of a specially grooved roller. The groove is directly beneath the line of the overlay; thus, the line is not printed.

Another method is to use a cut-out roller to delete an added entry in machines equipped with two rollers. In this case, the master has the longest added entry already typed on it. The added entry cards are reproduced first with the complete roller; then the necessary unit cards are produced with the cut-out roller which deletes the added entry.

This method is economical for about five sets of cards per title. It is not as practical as using overlay headings, because only one added entry can be produced this way; all others must be typed individually.

An advantage of offset reproduction is the number of ways in which it is possible to create a master. Masters can be typed with a standard office typewriter, using a multilith ribbon. Electric typewriters also need a multilith ribbon, although the use of a carbon ribbon gives the best results.

If Library of Congress proof cards are available and a library has a high percentage of foreign titles, the Xerox process or Ektalith process should be considered to make masters.

Xerox

The Xerox machine consists of a camera, a processer, and a fuser. All are rented as a unit. The camera transfers the image to be reproduced, the processer does the Xeroxing, and the fuser makes the image permanent.

The operation is based on the peculiar characteristics of selenium, an element that has high electrical resistance in the dark and relatively low electrical resistance when illuminated. An extremely thin film of selenium deposited on an aluminum plate is the basic working tool of Xerography. The first step in the process is to charge this plate electrically, to render it light-sensitive. The charged plate is then exposed by a camera. When exposed, the dark areas of the image retain the electrostatic charge, while the light areas lose the charge. Resinous black powder is cascaded over the plate. This powder is attracted to and held by the charged area, and thus brings out the image. An offset master (or perhaps card stock) is laid on this plate and the powder is transferred to it electrically. The master is then cleaned and baked to fuse the resinous powder to the master.

One advantage of Xerography over typing arises out of the former's ability to reproduce a photographic image. The image is reproduced without error and without special knowledge; thus, long, complicated catalog cards—even those in non-Roman alphabets—are reproduced without difficulty. The second saving comes in the elimination of proofreading. In addition, the machine is easy to operate. No special skills or knowledge are required, and it is a completely dry process. Through the camera, it is also possible to increase or reduce the size of the image.

An important advantage of a Xeroxed master is that the copy can be changed. If necessary, editions or the call number can be easily wiped off, the master fused, then inserted into a typewriter, and a new edition or call number typed on.

Xerox does have disadvantages. Humidity tends to negate the electrical charge. Unless a room is dehumidified or air conditioned, the machine will not perform satisfactorily on humid days. Cleaning the master is a delicate, time-consuming process although the use of an eraser board can reduce the cleaning time as much as 50 percent. Xerox plates are expensive and easily damaged, and with continuous use they lose their strength.

It is possible to Xerox four, six, or eight titles at once. With eight titles, however, the image must be reduced at least 8 percent to get all of the cataloging information onto the Xerox plate. All cards are placed with the call numbers on the inside so that the four on the right are right-side up, while the four on the left are upside-down. Because reduction draws the image in, this places the wider margin always on the right-hand side of the reproduced cards.

Model B, an early model, rents for $50 a month. Model D, the latest model, rents for about $100 a month. These machines can process up to 35,000 titles a year. When card reproduction needs exceed this figure, a library should switch to Ektalith to create its masters.

Ektalith

Ektalith is a dye-transfer, projection-photocopying process developed by Eastman-Kodak. The Ektalith equipment consists of a loader-processer, and a transfer unit. In addition, a standard copying camera must be used to expose the transfer paper to the copy. Several models of copy cameras are available. A complete system sells for $1,700 or rents for $104 a month. Cameras are available with either vertical or horizontal exposure trays to suit the requirements of the library. Catalog cards to be copied are placed in these trays. Exact registration is important at this stage and it may be necessary to use a T-square to align the four or more catalog cards to be copied.

After exposure, the negative is developed in a small box which is, in effect, its own darkroom, so the process is quite simple so far as the operator is concerned. The negative is a gelatin-dye emulsion paper. A paper master is placed in contact with the negative in the box and the dye is transferred to the master, thus producing the image. Upon removal from the box, the negative and master are separated and allowed to dry. As in the Xerox process, the master picks up shadows and must be cleaned to get good copy. Cleaning is done with a gum eraser after the master has dried. It is also possible to increase the exposure to burn out some of the shadows or to reduce the copy 5 percent which eliminates most of the lines that form around the edges of the card.

Ektalith is not affected by humidity, is faster than Xerox, and produces copy at least as sharp as that produced by Xerox.

Other machines that create masters

Offset masters can also be produced by Verifax, another Eastman-Kodak process. This dye-transfer method uses contact photocopying rather than projection photocopying (as does Ektalith). The contact method does not produce as sharp a copy, and registration is a problem. Few, if any, libraries are using Verifax machines for the reproduction of card masters.

Another method of producing offset masters is with the electronic scanning machine mentioned earlier in connection with the making of stencils. The copy is made in the same manner; that is, scanned electronically, but a special electro-sensitive offset master is used in the place of a stencil.

The same difficulties are present in this process. The machine is expensive, the reproduction is of poor quality, and the process is slow. There is the further limitation that these offset masters must be used within eight hours. The process is not recommended for reproducing catalog cards.

Two other methods of creating offset masters are available, but are not recommended. One is direct photographic transfer and the other, the use of a Thermofax machine. The former is too expensive, and the latter gives reproduction of poor quality.

Other card reproduction machines

A number of other methods of reproducing cards are used in libraries. Many are too costly or produce inferior results. The more common processes are discussed below.

The least expensive is fluid duplication. A. B. Dick, Ditto, and Standard Duplicating Machines Corporation make fluid duplication machines selling for $80 to $850.

In the fluid duplication process, the cataloging information is typed on a Hectograph carbon paper master. The master is cut to card size and placed on a machine which works like a stencil duplicator. Alcohol activates an aniline dye which is transferred from the master to the card stock as the stock is fed through the machine. The aniline dye creates the familiar purple image which is, unfortunately, not permanent. For this reason, fluid duplication is an unacceptable process for reproducing cards for most libraries.

This disadvantage may be eliminated by using a "Perma-Copy" fluid recently developed by Ditto, Inc. If this fluid is successful, fluid duplication may be satisfactory for many school or public libraries. However, pending substantial proof of permanency of the image, fluid duplication should not be considered for card reproduction.

Some libraries use addressing machines. There are two types: those using fiber stencils and those using metal plates.

The Elliott Company makes the fiber stencil equipment. The stencils come mounted in cardboard frames. These must be thoroughly soaked before they can be typed and thus are first placed in a moistener. They are then typed with a standard office typewriter. The stencils are placed in an addressing machine where a printing pad contacts the stencil, forcing ink through the perforations onto the card stock.

Addressing machines are expensive, costing about $1,500. They are, moreover, not recommended for card work because the size of the stencil restricts the amount of cataloging information to nine shortened lines.

Addressing machines using metal plates as masters are made by the Addressograph-Multigraph Corporation. These machines cost $1,800 and also require a $2,000 auxiliary device with which the metal plates are stamped. Thus basic equipment costs are high.

This process is started by embossing the metal plates with the catalog information. The plates are then inserted into metal frames and the frames placed in the magazine of an addressing machine. The machine automatically brings the plates to printing position. The platen, which is mounted on the operating arm of the machine, is brought down against the card stock and the copy is reproduced through an inked ribbon.

Because this method can produce only nine lines of copy, it has no advantage over fiber stencils and is more expensive. Both methods are unsuitable for catalog card reproduction.

Automatic typewriters are also used for catalog card reproduction. The Friden Company produces the Flexowriter, Remington Rand and Royal McBee have similar machines. Prices range from $2,000 to $3,500. This process cuts coded perforations on paper tape as the catalog copy is typed. After removal, the ends of the tape are joined and the tape loop is placed in a tape reader. The reader operates the typewriter automatically by electrical impulse. As a set of cards is typed by the tape, cards can be fed individually, or a continuous-form card stock can be used. The latter is perforated to a three- by five-inch size, and is torn, or burst, apart later. The use of continuous card stock allows the operator to be free for other duties, such as typing headings on the cards, but produces catalog cards with rough top edges which wear poorly and are easily soiled.

An automatic typewriter cannot produce unit cards much faster than a good typist. The saving results only when the operator is freed for other duties; and because, after the original card is proofread, no further proofreading is necessary. Even so, this method is very slow compared to stencil or offset duplication.

The automatic typewriter method is also expensive, using delicate machines that are easily thrown out of operation. Errors must be caught at the time they are made; otherwise a new tape must be cut. Correcting errors is more time-consuming than in most other processes. Additional errors can be avoided, however, because all copy except the portion to be corrected will be produced automatically. These machines are also noisy. It is questionable whether they should be used in a room where cataloging is done.

Tape typewriters may be practical in card reproduction if the typewriters are used elsewhere in the library's operation. Otherwise their slowness, noise, and expense make them impractical for card reproduction.

Cards can be reproduced directly by electrostatics. This is possible with standard Xerox equipment, with the Xerox 914, and with the Xerox Copyflo. Reproduction is also possible with other electrostatic machines which are beginning to come on the market. The latter may make the real breakthrough in card reproduction and, perhaps, all kinds of copy reproduction. These electrostatic machines work on the same principle as Xerox. The light-sensitive substance in this case is an inexpensive compound, zinc oxide. A very thin coat of this material can be spread on masters or card stock. The paper is charged, exposed to the cataloger's copy, dusted with resinous powder, and then fused. This eliminates the need for the expensive and delicate selenium plate or drum of the Xerox process.

The first machines being marketed are roller machines. These are not particularly adaptable to card reproduction. Registration and image quality are poor when the cataloger's copy must flow around a series of rollers. Only machines with flat exposure beds should be considered for card work.

The new machines are also currently priced just below their Xerox competitors. As more models come out, they will compete with the older ones and the price should fall.

At present, standard Xerox equipment is being used to reproduce cards directly by Xerography. Some commercial companies have gone into the reproduction of catalog cards using the Copyflo machine. (The machine rents for more than an individual library can afford.) So far, this procedure has provided the least expensive way of reproducing an entire catalog. It has not been quite so successful, however, in reproducing sets of catalog cards.

The cataloger's copy must be microfilmed, an exposure being made for each card needed in a set. The cards are run off on continuous-flow card stock and are later cut to size and punched. The result is only fair. Many cards have a background haze and some have unwanted spots and lines. The cost ranges from three and one half to seven cents a card and there is usually more delay than in less complicated methods of reproduction. The operation also makes the library dependent on an outside source for its reproduction of cards which is a disadvantage because such sources are often insensitive to, and uncomprehending of, a library's needs and requirements.

The Xerox 914 is an electrostatic copier, designed for office work. Many larger libraries have rented this machine for general copying, and have tried to adapt it for card reproduction. A few libraries are using it to reproduce masters and at least one is using it to reproduce cards directly.

The Xerox 914 is not easily adapted to either type of reproduction. Those producing masters are able to get four titles on a strip. Exact reproduction is ensured by putting the cataloger's copy in a jig. There is no difficulty in producing a master; the problems come in trying to clean the end product of the familiar unwanted blotches and lines that have been fused into the master while it was in the machine. Cards produced directly are similarly untidy. Also, the Xerox 914 machine was not designed to handle the heavy card stock. There have been occasions in which card stock has stuck in machines and burned. Significantly, every machine is equipped with a fire extinguisher.

Xerox Models B and D can directly produce cards which can be cleaned before they are fused. The produce is excellent but, unfortunately, too expensive for general card reproduction. Xerox is recommended only for the production of masters, using the Standard Model B or Model D equipment.

A few libraries use diffusion transfer methods with such machines as the Dri-Stat and the Copease Duplex Book Copier. Some have also used the Diazo process and a direct photographic process such as the Photostat, but such uses are rare.

Conclusion

The future for card reproduction is very bright. The development of the new electrostatic machines promises dramatically reduced costs to large libraries. For small and medium-size libraries, the Council on Library Resources has under way a project to develop a new, card-size, multiple-stencil duplicating machine. The unique feature of this machine is its ability to reproduce, from a single stencil, sets of completed cards with as many as five different headings within a set. This feature will be especially important to libraries requiring several sets of cards for each title and will make the stencil duplicating process even more attractive in comparison with other processes.

The most exciting development in catalog card technique today is the Library of Congress "Cards with Books" Program. This program makes it possible for libraries to receive LC cards with the books when they come from participating book dealers or publishers.

Cards with Books offer some of the advantages of Cataloging-in-Source, and there is no question of its feasibility. Its economies result from the ability of the Library of Congress to send out multiple sets of LC cards for a fraction of the total cost of sending them individually to libraries. Book dealers and publishers will order sets of cards for each title to be stocked in quantities of fifty or more. The packages of cards will be stored alongside these books and when a library orders a copy, a set of LC cards is placed in the book and the package shipped to the library. The sets are standard 3 SAT, which gives each library three author cards, and one card for each subject, added entry, and title traced. They are prepared and packed at the Library of Congress; the dealer's only role in this process is to buy the cards and pass them on.

For libraries, the system will eliminate ordering Library of Congress cards, of filing the records, and of placing the cards with the books when they arrive.

The cost of the sets to the dealers is low enough to permit them to absorb it and not pass the cost on to libraries. However, even if they do pass this cost on to the libraries, the result is far cheaper to the library than the cost of purchasing individual sets of LC cards today.

Few dealers now participate in the program. A few who do are Bro-Dart, Follett Library Book Co., and Imperial Book Co. Others apparently wish to avoid the extra work and expense. It appears, however, that all it will take is increased demand from librarians to get a majority of dealers into this program.

The importance of the Cards with Books program to libraries cannot be over-emphasized. Once in effect, it will solve all card reproduction problems for school libraries and for small and medium-size public libraries. The program will mean substantial savings to all other libraries, no matter how large or specialized.

For libraries that cannot wait for these developments and must have equipment now, present choices can be stated quite simply: A small library should buy a post card-size stencil duplicator. A medium-size library should invest in a full-size stencil duplicator. A large library should use an offset machine with additional Xerox or Ektalith equipment, if needed.

• 5 •

Equipment and Methods in Photocopying with Special Emphasis on Copying from Bound Volumes

Frazer G. Poole presided over the Saturday, June 16, session of the Equipment Institute during which William R. Hawken, document reproduction consultant of Berkeley, California, presented two papers: the first on equipment and methods in photocopying and the second on equipment and methods in producing full-size copies from microtext. Following Mr. Hawken's second talk, the meeting was opened to questions and answers.

WILLIAM R. HAWKEN: My first topic this afternoon has been announced in the program as *"Equipment and Methods in Photocopying with Special Emphasis on Copying from Bound Volumes."* Somebody had better put some emphasis on copying from bound volumes, since most of the manufacturers certainly aren't. I recently completed a study of twenty book copiers. At least, they were all advertised as machines capable of making copies from bound volumes. Only five of these twenty machines showed any evidence whatsoever of having been designed with the idea in mind of making a successful copy from a bound volume. I use the term "successful" advisedly: Sometimes you make it and sometimes you don't.

All of the machines do a satisfactory job in making a copy of a loose-sheet original, such as a typewritten letter. If, perchance, the shape of a machine lends itself to the copying of a page from a bound volume, then it becomes a book copier, and, what is worse, becomes advertised as such.

If the machine is advertised as a book copier, it is bound to be of interest to librarians.

During the past few years, a seemingly endless array of new photocopy machines has been announced in advertisements. All of these machines are *new;* everyone is *different from....* Each is *better than ...* and what is more, they are of jet-stream design and finished in decorator's colors.

The advertisements inform you, in one way or another, that this machine, or this process, or this material is the one you have been waiting for. At first glance, this may sometimes seem to be so. And this is why the Library Technology Project has retained me—to give that second glance, which is not intended to be withering; but nonetheless, quite a few nationally advertised book copiers can't stand up to it.

I don't want to be too hard on the manufacturers. They have to live too. The plain, economic fact simply is that there is a very large market for photocopying equipment in the world of business and industry, compared with which the library market is very small indeed. To design and construct equipment for a limited market is bound to result in high costs and high selling prices, and few manufacturers are willing to go out on that limb. From the standpoint of technology, there is nothing missing which would prevent the design and manufacture of efficient book copying equipment. The only thing standing in the way is money.

I was recently talking to a manufacturer's representative about a book copier which his firm is working on. He was somewhat apologetic about the estimated selling price of $1,200. He said: "I wish we could find something else that it could do." In other words, another market for it, and a larger one.

With very few exceptions, photocopying equipment is designed to meet the needs of business and industry and, if, incidentally, it happens to be useful in the copying of library materials, that is fortunate.

My only quarrel is with machines which are advertised as book copiers when they were never designed for this purpose and do only a very mediocre job.

I think, now, of a scene that occurred recently at the Museum of Modern Art in New York, at the time when a show called "The Art of Assemblage" was being installed. The story goes that John Cage, the Composer, was helping to set up the show, and a visitor to the museum happened to find his way into the gallery where Cage was working. After looking at some of the strange objects around him, he said to Cage: "You call that Art?" Cage immediately replied: "Hell no!" This really shook the visitor up, because he then said: "Well... in *that* case I kinda like it!"

If the manufacturers just wouldn't *call* them book copiers.

In the space of a talk such as this, it is impossible to go into a great deal of detail about all of the available book copiers currently on the market. I can only outline for you some of the basic principles involved and give you a synopsis of findings as to the performance of the twenty book copiers tested. After that, we shall consider certain facts about new machines which are attracting a good deal of attention.

There are two methods by which a photographic copy of a page from a bound volume can be made. I want to review them briefly.

The first of these methods is the contact reflex method. In contact reflex copying, a sheet of photographic paper is placed with its light-sensitive surface in contact with the page to be copied. It is held in this position while light is passed through the paper to the surface of the page where it is reflected back to the light-sensitive coating.

There are three basic requirements for making a successful contact or contact reflex copy: complete coverage, unbroken contact, and a correct exposure interval. Complete coverage simply means that the entire text of the document being copied must be in full view of the light source. Contact means that the surfaces of the sensitized material and the document are held in complete and unbroken contact for the duration of the exposure. Of necessity, this requires a certain amount of pressure. The correct exposure is one that will yield a fully legible copy of the entire text. It sounds simple enough.

In the course of testing nineteen contact reflex book copiers, six principal design requirements were established, all of which should be found in a good machine. These six requirements come under the headings of contact, coverage, angle, illumination, pressure, and timing.

1. Contact. The glass contact surface against which the sensitized material and the page to be copied are placed must be (a) perfectly flat and smooth, and (b) thick enough to withstand the pressure needed to achieve contact without any possibility of bending or breaking.

In several of the machines tested, it was found that the glass contact surface was not flat and smooth. In others, the glass was too thin and would bend under the pressure needed for contact. Either condition will cause breaks in the contact between the page being copied and the sensitized material. If the presence of such conditions goes unrecognized, much waste can result from repeated and futile attempts to produce legible copies.

2. Coverage. The method of positioning the glass contact surface over the illumination source must be such that the frame or supports for the glass do not curtail coverage at the inner margin area.

The most common condition in bound volumes causing difficulty in contact copying is the combination of a narrow inner margin with a tight binding. In many cases, it is impossible to position the entire page in contact with the surface of the glass because of the tightness of the binding. If, in addition to such losses of coverage caused by the binding, an additional loss is incurred because of the thickness of the support for the glass, the percentage of pages which cannot be copied will be substantially higher.

3. Angle. The angle to which the volume must be opened for copying should be 90 degrees or less.

Loss of contact at the inner margin area is substantially greater if a tightly bound volume must be positioned at an obtuse rather than an acute angle.

4. Illumination. The illumination system must transmit light evenly over the entire area of the glass contact surface.

Because of the inherently high contrast of photocopy materials, small local differences in the intensity of the illumination become exaggerated in the copy. An uneven field of illumination can therefore cause local over- or underexposure to the point of illegibility. The commonest fault with the illumination systems of a number of the machines tested is a fall-off of illumination at the edge of the exposure field. This can result in underexposure and illegibility of the text at the inner margin area, an area which is often difficult enough to copy because of the contact and coverage problems involved.

5. Pressure. A method of applying pressure to the volume by mechanical means should be provided.

In copying average subjects on machines which require the use of hand pressure for achieving contact, pressures of 40 to 60 pounds or more are frequently required. In copying pages which are wrinkled, creased, or warped, pressures of 100 pounds or more are not unusual. This may be more than your operator weighs and might be a point to keep in mind when hiring people to operate book copiers. Because, for any given subject, an operator cannot know how much pressure may be required, the use of excess pressure (and hence of operator effort and consequent fatigue) is the only way that waste copies from failure to achieve contact can be avoided.

6. Timing. The exposure timing device must be accurate, consistent, easily read, easily set, and conveniently located.

In copying pages of which any portion is printed in a small type face, exposure errors of as little as 5 percent can make the difference between a legible and an illegible copy. If the exposure timing device performs erratically, copying such pages becomes a hit-or-miss proposition involving extensive waste. The same will be true if the scale divisions on the timer are not large enough to be set accurately for small increases or decreases in the exposure interval required. Where hand pressure must be used to achieve contact, the timer must be within easy reach of the operator.

Suppose we proceed now to look at the box scores of the nineteen machines tested against these six requirements.

1. Three of the nineteen machines did not have an exposing surface flat enough and/or strong enough for good over-all contact.

2. Nine out of nineteen machines exhibited fixed coverage losses extensive enough to limit their ability to copy from volumes having narrow inner margins.

3. Eighteen of the machines have book position angles of 90 degrees or more, which caused difficulty and sometimes made it impossible to achieve full contact at inner margin areas.

4. Eight of the machines had illumination systems showing varying degrees of unevenness which caused many remakes and some failures.

5. Fourteen of the machines are not equipped with a mechanical pressuring system for contact. This also resulted in many remakes and the expenditure of great physical effort on the part of the operator.

6. Eight of the machines were equipped with exposure timing devices which were not sufficiently accurate or consistent to provide an adequate degree of control over the exposures required for finely detailed subjects.

In addition to these defects, seventeen of the nineteen machines require that bound volumes be handled in an upside-down position which, with large or heavy volumes, is not easy to do and entails a constant risk of physical damage to the volume.

It will readily be seen that, in copying with machines having one or more of the faults listed, remakes, waste, and, in some cases, complete failures are bound to occur, even in the hands of a skillful operator.

I recall one manufacturer's representative (who knew what I was up to) asking me one day what I thought of his machine, which, by the way, exhibited quite a number of serious faults. I was instantly reminded of an incident that occurred at the time when Sir Herbert Beerbohm Tree was England's leading drama critic. Sir Herbert had been sent the manuscript of a play written by an aspiring young playwright with a request for the critic's comment. After reading it, Sir Herbert wrote the young man a letter:

> My dear Sir:
> I have read your play. Oh, my dear sir!
> Very truly yours,

It should also be pointed out that the average user, who is meeting with indifferent success and a high percentage of waste, may not know what factors are causing trouble. He may not know that the glass is not strong enough or its surface not smooth. He may not know that remakes for over- or underexposure are the fault of the exposure timing device. In a word, lacking his own testing facilities, he is obliged to assume that the machine has been properly designed and constructed to do the job for which it was intended—an assumption which, as has been shown, is often incorrect.

The second method for bound-volume copying is the optical method.

The essential elements of an optical copier are simply those of a camera: a lens, an enclosure for the sensitized material, a stage or easel on which the material to be copied may be placed, and an illumination system. Some optical copiers are equipped with focusing systems which provide for some degree of control of the size of the copy. Others are of the "fixed focus" type, usually set at a 1:1 size ratio.

The presence of a lens in a copying device alters the process of copying in many significant ways. In the first place, the problem of contact, which is absolutely essential and often difficult to achieve in contact reflex copying, is eliminated. In its place is introduced another factor known as "depth of field."

To explain the idea of depth of field in the simplest possible terms, let us say that the lens of a copying device is focused on a plane surface on which a document has been placed. If an exposure is then made, the resulting copy will be clear and sharp. Now, if we were to raise the document off the plane surface by, say, 1/8 inch (i.e., move it closer to the lens), or, lower it the same distance (move it further away from the lens), the copy may still be acceptably sharp. However, if we were to raise or lower it by, say, one inch, the resulting copies might then be extremely out of focus and illegible.

Depth of field is a highly relative thing which depends on the focal length of the lens, the relative aperture of the lens, and other factors. It is not necessary to go into an explanation of what all these factors mean. Suffice it to say, in a copying device with a lens of a given aperture and effective focal length, a subject can be nearer or farther away from the plane of focus within certain limits before the image is sufficiently out of focus to be illegible. But even this plus or minus distance, in terms of the legibility of a copy, is not an absolute. The outlines of large, bold type may be quite fuzzy and unclear without destroying the legibility of the text; but only a slight degree of fuzziness of outline will make a text in a small type face illegible. Effective depth of field is, therefore, relative to the size, line width, and other characteristics of the text being copied.

In book copying with optical copying devices, depth of field is of considerable importance because, in the copying of tightly bound volumes, the inner margins tend to curve away from the plane of focus. What becomes all important, then, is how far away from the plane of focus the inner margin can recede before the text at the inner margin is no longer legible. With an optical copier, such as the Xerox 914, the operator is obliged to coerce the tightly bound volume into a position within which the useful depth of field of the lens will be able to record the text in a legible form. How much force is necessary will depend on the tightness of the binding, the extent of the inner margin, and the size of the type face in the inner margin area which must be reproduced. An optical copying method, while thus freeing the operator from the sheer physical effort of flattening the entire surface of the original into contact with the sensitized material, imposes, in its own ways, other limitations and other requirements.

"Coverage" in an optical copier simply means that all of the subject to be copied is in full view of the lens. The book angle with an optical copier is always on the order of 180 degrees, but depth of field allows for the copying of many subjects which, in the same physical position, could not be copied by contact methods. "Fixed coverage loss" in contact reflex copying is here translated into depth of field. If the inner margin area of a tightly bound volume cannot be coerced into a position which is within the depth of field of the particular lens system employed, a "coverage" loss will ensue. Exposure timing with most optical copiers is more easily manageable by the nature of the processes employed. Exposure latitude is usually much greater. With the Xerographic system used in the 914 copier, exposure is fixed; no guesswork is necessary.

Optical copiers, by the nature of the method, are more complex than contact copiers and must meet much higher standards of design and construction. These factors, together with a lens of a long focal length which, in itself, is quite an expensive item, make the price of optical copiers much greater than contact copiers. With optical copiers, however, there are no problems of contact and coverage; the rate of production is often faster, and, with some machines, the operation is automated to a high degree. Exposures are easier to control and exposure latitude is greater, which reduces waste. With some optical copiers, an enlarged or reduced-size copy of the original can be made. Unit costs per copy may be equal to or even lower than the cost of copies made by contact reflex methods. These many advantages, however, can only be acquired at the cost of a large capital investment or a high monthly rental. Also, such machines cannot be operated economically unless a fairly large volume of copying is being done.

Certainly one of the most talked-about optical book copiers currently on the market is the Xerox 914. At an annual rental of $1,140, it is a costly machine, which must produce a great many copies if unit costs are to be held down. For example, if only 100 copies are made per month, the labor and materials costs per copy will be 97 cents. At 500 copies per month, this cost is down to 21 cents, and at 1,000 copies, 11½ cents per copy.

Faced with the need for a book copier, the librarian-consumer thus finds himself in the position of having to choose between (a) low-efficiency contact reflex copiers coupled with low initial costs and (b) high-efficiency optical copiers acquired at a high cost. He might well wish for something between these two extremes, and this is precisely what is needed. Such a machine would either be a contact reflext copier of a design which would be far more efficient than present equipment, or an optical copier substantially lower in cost than the Xerox 914 machine. In contact reflex copying, the nature of the method itself is such that 100 percent efficiency cannot be achieved. There will always be a certain percentage of pages in bound volumes, which, because of their particular physical characteristics, cannot be copied by contact methods. Such pages usually can be copied by optical methods. On the other hand, the introduction of a lens system large enough for the copying of 8½ by 11-inch documents at a 1:1 ratio is, by itself, costly. Contact reflex copying is a manual process and therefore is not as rapid and simple as optical copying can be. But, as shown in the example of the Xerox 914 machine, the cost of automation can be very high.

A compromise solution is therefore indicated, and can be approached in two ways. The first would be in developmental work on an optical copier employing a process other than Xerography. The very nature of the Xerographic process is such that high engineering and manufacturing costs are unavoidable. Verifax, DTR, stabilization, and Electrofax materials possessing sufficient speed for use in an optical copier are already available. Optical copiers employing these materials exist but, for the most part, they were designed for purposes other than book copying and are large, complex, and costly.

A second approach would be in the improvement of the design and construction of contact reflex copiers and in this area, as the machine analyses have shown, there is considerable room for improvement.

Since the conclusion of the first phase of the book copier testing program and the publication of the report (*Photocopying from Bound Volumes*, by William R. Hawken, Chicago: American Library Association, 1962), no contact reflex book copiers significantly better than those tested have appeared on the market. One, however, is sufficiently different from all others that it is worth mentioning. This is a unit called the Thermofax Companion Unit Model 48, and it is on display here. This unit will attract attention on two counts. In the first place, the process is completely dry: the processing of the exposed sheet is accomplished by running it through an office-type Thermofax copier. Secondly, the sensitized material used is not limited in its response to colors, or inks of certain kinds. It thus extends the utility of any Thermofax copier.

To make a copy, a sheet of film is placed in contact with the original and exposed. The exposed film is then placed in contact with a sheet of white copy paper and covered with a sheet of black masking material. This sandwich is then placed in the silk-screen carrier used in Thermofax copying and passed through a Thermofax machine. The film and the masking sheet are then removed and the copy is finished. A copy can be made in about a minute. The cost of materials per copy is 7.7 cents. Since, up to now, I have not been able to ascertain any details about the chemistry or physics of the process employed, I have no idea as to the stability or permanence of the copies.

In the report, *Photocopying from Bound Volumes*, a short chapter entitled "Notes on the Stabilization Process" was included, but at that time there were no book copiers using this process. Since that time, new developments in the use of the stabilization process have reached a point where this process is now of considerable importance in the entire photocopy field. It is being used in office copying machines; it is being used in three of the reader-printers currently being tested, and is also used in two new optical book copiers.

Because of the growing importance of the stabilization process, I want to take a few minutes at this point to make clear what stabilization means and how the process works.

The fundamental difference between conventional processing and stabilization processing lies in the different chemical treatment of the exposed and developed silver halide image.

To form a permanent or even a semi-permanent image by conventional processing techniques, the silver halides which were not used in the formation of the developed image, and which, if allowed to remain in the print, will rapidly turn dark on exposure to light, are dissolved out of the paper by means of a "fixing bath"—the well-known hypo. Following this fixation step, the hypo, now laden with silver compounds, must be removed from the paper by prolonged washing.

In the stabilization process, the unused silver halides are not removed from the print. Instead, they are chemically converted into substances which are relatively inert and which are not readily affected by the subsequent action of light, heat, or atmospheric conditions. Thus the classical four-bath method—development, rinsing, fixation and washing—which might take upwards of an hour, is reduced to two steps: development and stabilization, which can be accomplished in seconds. Also, the photographic darkroom, with sinks, plumbing, trays, and other paraphernalia has been replaced by a small, simple, relatively inexpensive machine which can be operated in the light.

As an example of the speed which the stabilization is capable of, the leading edge of an exposed print fed into a Polymicro stabilization processor emerges just 5 seconds after entry, and an entire 8½ by 11-inch print is out in 13 seconds. As the prints leave the stabilization bath, they are pressed between two rollers which remove most of the moisture. On exposure to air, the prints will become dry in a few minutes' time.

Stabilized copies, by the nature of the process, are of doubtful permanence. Depending upon the conditions of light, heat, and humidity under which they are stored, they will keep for a period of months or for many years without appreciable change in their appearance, but they cannot be considered to possess what is usually called "archival" permanence.

To go on now to the two optical copiers employing stabilization processes: the first of these is called the "Arcor" and is an import from France. The second is called the "Docustat," and is manufactured by Documat, Incorporated, of Waltham, Massachusetts. Both of these machines are on display here.

To make a copy with the Arcor, the document to be copied is placed on the exposure surface, a button is pressed, and the exposed sheet of paper, which is cut from a roll, is advanced through a stabilization processor and out of the machine.

There is nothing to be gained by my giving you a detailed verbal description of the workings of the Arcor since you can see it in operation in the exhibit area.

Instead, I want to draw some comparisons between the Arcor and its product and the Xerox 914 machine and *its* product. The availability of the Arcor on a rental basis was first brought to my attention by Mr. William G. Harkins, Associate Director of the University of Florida Libraries. His interest in the Arcor stemmed from the fact that he was unable to obtain a Xerox 914 machine because the Xerox Corporation would not make one available until enough units were on order in a given area to justify the establishment of a local service office for the maintenance of the machines. This undoubtedly makes economic sense from the point of view of the Xerox Corporation but certainly works a hardship on the Library in question. Here is a library with a real need for such a copier—whose volume of copying is great enough to justify the relatively high cost of a 914 machine—but is unable to obtain one.

The company distributing the Arcor in the Gainesville area quoted Mr. Harkins a rental of $90 per month. In San Francisco, the company handling the Arcor quotes a rental of $125 per month for six months and $100 per month if the rental period is one year. A thirty-six month lease-purchase plan is also available at $83.84 per month. Since the $90 rental quoted to Mr. Harkins and the $100 figure quoted to me bracket the $95 per month rental cost of a 914 machine, let us assume that the rental costs of the two machines are the same. It is immediately evident that the volume of copying done each month will have to be very large indeed to keep the overhead cost per copy at a reasonable level. At a volume of 1,000 copies per month, the rental cost alone will be 9½ cents per copy, and at 2,000 copies per month, 4¾ cents per copy. The labor cost of copying with either machine should be about the same; the biggest difference between the costs of Arcor and Xerox copies is in the materials costs.

The materials costs of Xerox copies are approximately one cent; but for Arcor copies, they are approximately six cents. Therefore, at a monthly volume of 2,000 copies, the labor, materials, and rental costs of Xerox copies made on the 914 machine will be approximately 6¾ cents, whereas Arcor copies will cost approximately 11¾ cents—almost 75 percent higher than Xerox copies. The one important difference affecting this cost picture is that the Arcor can be purchased outright; the cost can be amortized at a monthly rate lower than the rental and overhead eventually reduced to nothing more than service and maintenance. For the present, at least, the rental cost of the Xerox 914 machine continues indefinitely at the rate of $95 per month.

In comparing the processes and products of the two machines, it should be noted that the stabilization process used in the Arcor is a wet process. Copies emerge from the machine in a state which, in the curious jargon of the trade, is called "damp-dry."

The Xerographic process, on the other hand, is completely dry. Arcor copies are negative. Xerox copies are positive. If a positive copy is needed from the Arcor, a negative copy must first be made and then recopied, which doubles the cost. Arcor copies are on a paper stock which is coated on one side with a gelatin emulsion and which, depending on the conditions under which they are stored, may curl. Xerox copies are on a plain, uncoated stock. The permanence of stabilized copies is highly open to question, whereas Xerox copies are as permanent as the paper on which they are printed. Arcor copies measure 8½ by 12 inches and must be trimmed before they can be filed. Xerox copies are 8½ by 11 inches and need no trimming. The sharpness of copies produced on either machine is satisfactory and approximately equal. While regulation of the exposure is required in some cases with the Arcor, and not with the Xerox 914 machine, the exposure latitude of the paper used in the Arcor is great enough to overcome the waste usually associated with the problem of trial-and-error exposure determination.

The Docustat is, in general, quite similar to the Arcor in its operation, since both are optical, stabilization-process copiers. The product of the Docustat is quite similar to that of the Arcor, except that it is 8½ by 11 instead of 8½ by 12 inches. The Docustat, however, has two size settings—one for letter-size originals, which are reproduced at approximately 85 percent of life size, and another for 8½ by 14-inch legal-size documents, which are reproduced at about two-thirds of original size. The major difference between the Arcor and the Docustat is this: The Docustat is not a copying machine which you can purchase or rent and then use in your library for making copies, as you would with an Arcor or a Xerox 914 machine. It is a coin-in-the-slot vending machine for self-service copying by the public. Each copy costs 25 cents. It is installed and serviced by an agent who collects the profit from this operation and pays the library a percentage of the gross receipts of the machine in return for the privilege of having it installed in some advantageous location in the library where library patrons will have access to it. According to Mr. J. H. Smith, Vice-President of Documat, Inc., Docustats have been installed thus far at the Harvard Medical School Library, the Harvard Business School Library, Brooklyn College Library, Brooklyn Public Library, and Manhattan College Library.

The Docustat introduces a new factor into the economics of book copying. As has been pointed out, the unit cost of copies produced on either the Arcor or the Xerox 914 machine can be well below 25 cents each, but only if the volume of copying is quite large. While, on the other hand, the materials cost for contact reflex copies is well below 25 cents, the relative inefficiency of the method is such that trial-and-error procedures, remakes, waste, labor costs, and machine maintenance can easily run the cost per copy up to the 25-cent figure. Also, contact reflex copying from bound volumes is by no means a do-it-yourself operation for the uninitiated. The Docustat, therefore, despite the limitations of the stabilization process and of size, might prove to be very useful in smaller libraries that do not have a copying volume great enough to justify either an Arcor or a Xerox 914, especially in view of the fact that the installation of a Docustat does not require any capital outlay on the part of the library, and supplies and maintenance are the responsibility of the agent who installs the machine. Furthermore, since the library receives a percentage of the gross income of the machine, copies made by the library for its own use would cost less than 25 cents.

To conclude this resume of the present state of book copying equipment: now that electrostatic copies which employ the Electrofax process are beginning to appear, it is to be hoped that a book copier employing this process will soon appear. The advantages of the Electrofax process are the following: The copies are completely dry and are permanent. The copies are positive. The materials costs, although higher than the cost of plain paper as used in the Xerox 914 machine, are well below the costs of Verifax, Thermofax, diffusion-transfer, or stabilization-process materials. Reproductions of continuous-tone subjects are superior to those obtained with the Xerox 914 machine. The machines are less complex than Xerographic copiers and should be cheaper to purchase or rent.

MR. POOLE: I know we all appreciate Mr. Hawken's clear and very practical appraisal of current equipment for copying from bound volumes and particularly his review of these machines which have come on the market within the last few months. We've already had some commercial plugs from this platform, so it may not be amiss for me to put in a plug for Mr. Hawken's latest book, which is already going into its second printing. We have been selling copies out of the ALA warehouse like hotcakes in the last six months and I would like to point out that, for those of you who already have copying equipment, copiers, which, perhaps, are not the most efficient currently available, Mr. Hawken's book contains some very instructive chapters on how to operate each of the common types of book copying equipment. These instructions to your operator, if they don't help to make every copy perfect, will at least help them to get the most efficient operation from their machines. If you have not seen this volume, it would be well worth your looking at; we'll have copies available at the LTP booth beginning tomorrow afternoon.

• 6 •

Equipment and Methods in the Production of Full-Size Copy from Microtext

WILLIAM R. HAWKEN: Librarians have had a long-standing and, now, a continually increasing need for equipment for making copies of materials in their collections. For bound volumes, a good book copying device has long been needed but, today, bound volume copying is only one aspect of the problem. A second and, in many ways, more difficult problem arises from the fact that vast quantities of library materials are available—and in many cases *only* available—in microform. The problem is still further complicated by the fact that there are many sizes and types of microforms, some of which are transparent, some of which are opaque, some of which come in rolls of different widths and lengths, and some of which are in flat sheets of a number of sizes. Reading equipment alone for microforms is expensive, and few individuals can afford to purchase their own. Moreover, as library collections of microforms grow, the libraries themselves must budget more and more money for reading equipment—money which, I hardly need to remind you, is seldom easily come by. Again, the situation is worsened by the fact that a reader for micro-transparencies which may cost several hundred dollars cannot be used to read micro-opaques, and vice-versa.

Since the use of library materials which are in microform cannot be accomplished without some sort of reading device which, in most cases, imposes on the user the hampering restriction of "Library Use Only," it would be highly desirable if there were some efficient and relatively inexpensive means whereby the enlarged, projected image of a microform could be quickly reproduced on a piece of paper.

In the past few years, a number of reader-printers for microforms have appeared on the market and, naturally, have attracted a good deal of attention on the part of librarians. This is the reason why you are here today, why the equipment exhibits are here, and why I have been asked to come to talk to you about reader-printers. And this is why the Library Technology Project of the American Library Association has engaged me to make a study of reader-printers—a study which will be completed by the end of August and out of which a detailed report will be published and made available through the American Library Association in Chicago.

I would like to first define the limits of the current study of reader-printers. There are upwards of two dozen reader-printers currently on the market. The present study is limited to eight. Why this limitation? Simply because most of the machines available are not suitable for making prints from the kinds and sizes of microforms held by libraries. A number of reader-printers on the market are designed for the making of large prints from microfilms of engineering drawings mounted in electric accounting machine cards. Others are limited to 16 mm. or 70 mm. or other sizes of microfilm not usually found in libraries.

The machines currently being tested are the Filmac 100 and the Filmac 200-R, which are products of the Minnesota Mining and Manufacturing Company and are distributed through Thermofax sales offices; the Documat Mark I and Mark II, manufactured by Documat, Incorporated. A machine known as the Recordak Reader-Printer is nothing more than a Documat Reader-Printer with the Recordak name plate on it; an identical unit is also marketed by Remington Rand under the name of the Remington Rand Reader-Printer Model F-468. Others are the Andrews Paper and Chemical Company's "Rollacopy"; an identical machine is distributed by the Photorapid Corporation of America under the trade-name of "Micromate"; The Ross Microreader made by Ross, Limited in England; and the Universel, which is manufactured in France by O. L. Beauvais. Tests were also made on the Recordak MPE reader, with and without an accessory unit called the Fairfax Platen Elevator, which I will describe later. No testing has been done on the new Filmac 300. With machines such as the Rollacopy and Micromate, which come in two sizes—one for letter- or legal-size reproductions, and another capable of making very large prints of engineering drawings—the letter-size model was the one selected for testing.

Reader-printers function in accordance with certain optical and photographic principles which are relatively simple, well-known, and widely used in ordinary photographic practice. Light must fall on a microform image and either pass through it or be reflected from it through a lens which will magnify the image to readable size. The lens must be capable of being focused to bring the magnified image to maximum clarity and this image must fall on a plane surface where a sheet of suitable light-sensitive material can be placed. Following the exposure of the sensitized material, the latent image thus formed must be developed by means of some chemical or physical process. At the same time, this developed image must be rendered at least reasonably stable so that it will not be unduly affected by light, heat, or atmospheric conditions.

All of the commonly used methods for producing a photographic enlargement—methods which have been widely used for nearly a century—meet all of these conditions. Why, then, one might well ask, has the development of a good reader-printer for microforms been so difficult? The answer to this lies in three further problems imposed by the practical use of microforms. The first of these is the requirement that the enlarged print be produced under conditions of ordinary room light, such as one would expect to find in a library or an office, instead of in a darkroom. Second, the print must be produced very rapidly. Ideally it should be produced virtually instantaneously. Long print-processing times, such as are common in ordinary photographic work, are much too long for practicability in a reader-printer. Third, the print, however it is produced, must be dry, or at least sufficiently low in moisture content to be used immediately, or within a few moments. The long drying times common to ordinary photographic methods of print production also are not practicable. In recent years, a number of reader-printers have appeared, each of which offers a solution, or a partial solution to these problems.

The best solution to the problem of using a reader-printer in a brightly lit space is to enclose the sensitized material within the body of the machine in such a way that light from the illumination system of the reader will fall on the sensitized material when a print is to be made, but ambient light—the light in the surrounding area—will not. The four reader-printers in the Filmac line—Models 100, 200, 200R, and 300—and the two Documat reader-printer models—the Mark I and Mark II—are reader-printers of this type, which we shall call "internal projection" reader-printers. The Ross Microreader may also be considered an internal projection reader-printer, but since the sensitized material is not contained within the body of this device, it fails to qualify for full-fledged membership in this class.

All of the remaining reader-printers tested—the Rolla-copy, Micromate, and the Universel—are "external projection" reader-printers. The sensitized material is outside of the device. Light from the projection lamp passes through the lens and falls on the surface of the sensitized material. At the same time, the light in the room where the reader-printer is being used also falls on the surface of the sensitized material. This poses an interesting balancing problem. The light-sensitive material will have to be in a face-up position for whatever exposure interval will be required to produce a latent image. This exposure interval, however, will have to be below the threshold at which ambient light will begin to cause the paper to fog and darken. Since the exposure interval will be dictated by the density of the negative, the relative aperture of the lens, and the intensity of the projection lamp, avoidance of over-all fog can only be accomplished by reducing the brightness of the surrounding illumination to a safe level. Just how much the illumination will have to be reduced—that is, how near to a condition of relative darkness must prevail in the work area—will vary with the type of sensitized material being used, and the brightness of the image.

The solution to the problem of rapidly producing a print, which is almost dry, has been brought by the development of new processes. The first of these to consider is the electrolytic process employed in the Filmac line of reader-printers. The sensitized material consists of three layers: a paper base, a thin layer of a metal foil such as aluminum, and, on top of this, a coating of zinc oxide in a resin binder. This zinc oxide coating provides a photoconductive layer which, in the dark, acts as an insulator—that is, it has high electrical resistance. However, the action of light during exposure lowers the resistance in those areas where light strikes the surface. Thus, a latent image is formed in terms of differences in electrical resistance, the image areas having now become electrically conductive through the action of light. If the exposed sheet is then placed in contact very briefly with a suitable electroplating solution and D. C. electric potential applied, current can flow between the solution and the aluminum foil layer. This causes metal ions in the solution to deposit or "plate out" on the zinc oxide surface in the image areas to form a visible metallic image. This processing step, in which electrolytic formation of the image occurs, is accomplished with great simplicity, requiring, as it does, nothing more than drawing the zinc oxide surface over an ordinary cellulose sponge soaked with the solution. The processing of an 8½ by 11-inch print requires no more than about 4½ seconds and, since the surface of the print is only barely moistened during processing, the print can be considered, for all practical purposes, as dry. Another very important feature of the electrolytic process is that it possesses remarkable exposure latitude. With most microfilms, satisfactory prints can be made over a wide range of settings. While the prints will vary from light to dark, clarity of the image is not seriously impaired. Also, on the basis of what is publicly known about the chemistry of the process used in Filmac reader-printers, the prints should have a high degree of stability.

A second process, which also provides a rapidly produced print which is nearly dry, is the stabilization process (which was described in the talk on book copiers).

The Documat Mark I employs a variant form of stabilization known as a "Monobath." A Monobath is a single solution which contains both the developing and stabilizing agents. Since the processing time with this Monobath is slower than when a two-solution process is used, the manufacturer brought out the Documat Mark II, which is identical in all respects to the Mark I, except that the processing section has been changed to operate with the two-solution process.

While there are three reader-printers on the market which use electrostatic processes to produce a finished, dry enlargement in a very short space of time, none of these could be considered as likely equipment for library use. All were designed for the reproduction of engineering drawings.

To sum up thus far: we have two types of reader-printers—the internal projection type and the external projection type. We have two processes—the electrolytic process and the stabilization process. We shall go on now with analyses and comparisons between these types of machines and processes, starting with magnification control.

With a single exception—the Filmac 300—all of the internal projection reader-printers work at either a fixed magnification or achieve varying degrees of magnification by the use of different lenses. The Filmac 100 can be obtained with five lenses which provide magnification ratios of 7, 9, 13, 19, and 26 diameters. The Filmac 200 and 200R employ a single magnification of 15 diameters. Five lenses are available for the Documat which provide magnifications of 10.5, 13.4, 20.1, 27.9, and 33.8 diameters. The Ross Microreader has two lenses and an extension device to provide magnifications of 10, 15, and 18 diameters. For special purposes, 27 and 37 diameter lenses can be obtained. Controlling the magnification ratio by means of additional lenses is disadvantageous in one immediate respect—cost. Additional lenses for the Filmac 100 cost $66.50 each and additional lenses for the Documat cost $84. A far more serious drawback arises from the fact that, if the reduction ratio used in filming does not correlate fairly closely with one of the available magnification ratios, the image will either be larger or smaller than the original. If the magnification is such as to produce an image on the reader screen which is smaller than the original, it still may be readable and printable. But, if the magnification is higher than the reduction ratio used in filming, only a portion of the image will appear on the reader screen. Now, if such an overmagnified image is simply to be read, this can be done by shifting the image back and forth or up and down on the reader screen. But, if the image is to be printed, only the portion showing on the reader screen will show on the print and two or more prints will be necessary to reproduce the full text.

External projection reader-printers, such as the Rollacopy and Micromate, are quite similar in design to ordinary photographic enlarging devices, consisting as they do of a projection unit mounted on a vertical column which projects the image downward on the base board of the unit. The upper limit of magnification is determined by the height of the column. Intermediate magnifications of any degree are obtained simply by changing the height of the projection unit on the column.

The Universel reader-printer follows a general design scheme for microfilm readers which is fairly popular in Europe. The image is projected upward to a slanting mirror which reflects the image downward to the table top on which the reader is located or, if a print is to be made, to an easel which holds the light-sensitive material. The mirror is supported on two arms which can be extended to increase the degree of magnification. In the Universel, these arms have three V-notches cut into their lower edge which provide three degrees of magnification—7, 9, and 10 diameters.

The second aspect of reader-printers to consider is exposure control. Given a microfilm of a certain density, how does one determine what exposure to use in making a print? As with most office copying machines and book copiers, exposure determination is a "by guess and by golly" situation. Exposures, however, are not nearly so critical with reader-printers as they are with book copiers, for two reasons. In the first place, the electrolytic process employed in the Filmac line of reader-printers possesses, as I mentioned, great exposure latitude. In the second place, stabilization materials are lower in contrast and also have much greater exposure latitude than diffusion transfer materials, for example. In the hands of an inexperienced user, some trial-and-error and waste of stabilization materials will occur. A factor which contributes to uncertainty about what the correct exposure should be when using external projection type machines is that, for any given film, the higher the projection unit is raised on the column, the longer the exposure is going to be. With Filmac units, waste from incorrect exposure will seldom occur.

A third aspect is that of operating costs. Materials costs for producing 8½ by 11-inch prints by the electrolytic process on Filmac units are approximately 9 cents per print. The cost of stabilization process prints in the 8½ by 11-inch size will vary with the brand of materials and can range from 6½ to 7½ cents per print. Prints produced on the Documat Mark I by the Monobath process cost approximately 8½ cents each. Two factors which affect over-all operating costs are waste, which will vary from situation to situation, and frequency of use. With any process, the chemical costs per print are very small *if* the machine is in fairly steady use. For example, with the electrolytic process, approximately 600 prints can be processed in one pint of activator (which costs $1.25) if the prints are made in a continuous run. Average chemical life expectancy and costs based on customers' orders handled by one Thermofax sales office show a ratio of one pint of activator for every 300 prints, but this is still a chemical cost of less than ⅓ of one cent per print.

It takes four ounces, or 31 cents worth of activator, to ready the Filmac 100 for printing. If only 30 prints are made, the chemical costs would be more than three times as great but would still be approximately one cent per print, which is not excessive. A similar situation prevails with various stabilization process materials but, since a greater quantity of solution is needed in the machine trays, chemical costs due to evaporation losses during periods when the machine is idle can be considerably higher. If a stabilization process machine is used infrequently, the solutions should be siphoned out and kept in closed containers.

Now, having established a general framework of information about the reader-printers currently being tested, I wish to go on to a more detailed consideration of the individual machines, starting with machines of the internal projection type.

The Documat Mark I is a reader-printer which will accept either 16 mm. or 35 mm. microfilm and which can also be used to make prints from microfiche. The viewing screen is 11 by 11 inches in size, but only a 7- by 9¼ inch area of the screen image can be reproduced on a print. Lines showing the area that can be reproduced are scribed on the glass. To position the image to be printed in this area, the projected image can be moved back and forth and from side to side. The head can also be rotated 360 degrees. Once the image has been positioned, a print is made simply by pushing a button. Various mechanical events then occur within the reader which need not be described in detail. With the Documat Mark I, which employs a Monobath, the finished print is delivered from the machine in 45 seconds. With the Mark II, which uses a two-solution process, the finished print is delivered in 25 seconds.

Assuming reasonably good quality in the microfilm being reproduced, the printed image is a fairly well-defined black image against a white background. Although the image size is only 7 by 9¼ inches, the sheet on which it is printed is of the standard 8½- by 11-inch size.

Sensitized paper is loaded into a compartment at the rear of the machine in rolls which are 8½ inches wide and 150 feet long, thus providing enough paper for approximately 160 prints before reloading becomes necessary. Trays for the solutions are located at the front of the machine where they are easily accessible for filling, replenishment, removal, and cleaning. Focusing is accomplished by rotating a knurled knob at the top of the unit. When using lenses of different magnifications, evenness of illumination can be maintained by rotating a knob located at the top of the lamp house which adjusts the position of a condenser lens. The unit is well constructed and finished.

The principal drawbacks encountered in the use of the Documat are as follows:

Probably the greatest problem librarians will encounter is that of incompatability between the reduction ratio employed in filming a given original and the magnification ratios of the various lenses supplied with the Documat. If material is to be filmed and later reproduced on a Documat reader-printer—and *this is known in advance*—a suitable reduction ratio can be used which will permit the material to be reproduced at maximum size—one print per page. However, library collections of microforms are generally heterogenous collections of a great variety of materials collected over a period of years from a number of sources. Reduction ratios may range from 7 or 8 diameters to well over 20. Smaller-size library materials may have been filmed at reduction ratios which are below the minimum magnification of the Documat reader-printer, which is 10½ diameters. In such cases, it may happen that a single page cannot be reproduced on a single print.

A second problem has to do with film area and margins. The 7- by 9¼-inch area on 8½- by 11-inch paper suggests one kind of original in particular—a typewritten page and, more generally, office records of business, industry, and government. Such records exist in uncountable billions, and it is here that one of the largest markets for microfilm equipment and supplies is found.

Also, such records are usually filmed at high reduction ratios, and the magnification ratios of the lenses available for use in the Documat were selected to correspond to the reduction ratios most commonly used in the filming of such records, so that one document could be reproduced on one print. In a great many 8½- by 11-inch typewritten originals, the margins are ample and, in cases where they are not and the document must be reduced in size to the 7- by 9¼-inch print area, the size of the usual pica and elite type faces is large enough to withstand this reduction in size without loss of legibility. Such conditions are by no means always the case with library materials where very small type faces and small margins are a commonplace.

A common format employed in microfilming library materials is the full frame of 35 mm. nonperforated film, which measures 1¼ by 1¾ inches. Maps, graphs, folding plates, manuscript materials, and newspapers are frequently filmed on this full frame. Full-frame negatives, with a single exception, can be reproduced on the Documat, but only in sections. With the 10.5 diameter lens, four prints will be required; with the 13.4 diameter lens, eight prints; and, with the 20.1 lens, no less than 15 prints will be required. This makes printing costly and pages in many pieces are hardly convenient to read.

The one exception mentioned arises from what appears to be a design fault in the Documat reader-printer. It was observed that, when the 20.1 diameter lens is used, a part of one edge of a full frame could not be brought into view on the reader screen, because the scanning device, which permits the film to be moved for edge-to-edge scanning, simply does not go far enough in one direction. The inner edge of the film being viewed can be brought into position for printing but the outer edge cannot. The loss ranges from ½ inch of original size on materials recorded at 8:1 reduction ratio to approximately 1¾ inches at a 20:1 reduction ratio. If, for example, one wished to make a print of an article in a newspaper filmed at a 20:1 reduction ratio, it might well be impossible to position a portion of the article for printing. This is simply one more instance in which the design of a reader-printer or, let us say, the purpose for which it was designed, makes it unsuitable for certain common types of library microforms.

Another fault found in the Documat reader-printer was in the mounting of the glass flats which hold the film in position. These flats are mounted very close together; so much so, in fact, that in threading the machine, tension from the pressure of the flats was observable. While such close spacing ensures that the film will be held flat, it can also cause scratching of the emulsion surface if there is any dust or dirt on the film. Since the operation of the machine cannot be conducted in a vacuum, it would be preferable if the flats could be separated when the film is to be advanced.

The list price of the Documat Mark I is $850. With two additional lenses the total price comes to $1,018. The unit, with one lens, can be rented from the Recordak Corporation for $35 per month on a minimum rental of six months. Parts for replacing the Monobath processing section of the Mark I with the stabilization process section of the Mark II cost $50.

The first genuine reader-printer to appear on the market was the machine now called the Filmac 100 which was introduced in 1957. Whereas the Documat has its film carrier, lamp house, and lens at the top of the unit and projects an image downward to the surface of the sensitized material, the Filmac 100 has its lamp house in the base of the unit and projects an image upward to the sensitized material which is loaded into the top of the unit in rolls which are 8½ inches wide and 298 feet long. The paper on which the print is made measures 8½ by 11 inches, but the size of the screen, which determines the size of the image, is only 7 by 8¼ inches. Here again, the evidence points to the conclusion that the machine was designed for the reproduction of 8½- by 11-inch office records.

The machine will accept 16 mm. and 35 mm. microfilms. It can also be used to print from microfiche. To position an image for printing, the film can be moved back and forth and from side to side, and the head can be revolved a full 360 degrees. To make a print, the print button is pressed. In a few seconds' time, depending on the exposure setting chosen, the printed section of paper is advanced out of the machine where it can be torn off. There is a small amount of surface moisture on the coated side of the print which dries very quickly on exposure to air. The image is not black. It is grayish in tone, but is quite sharp and clear and easily legible.

The activator tray, which is conveniently located at the front of the machine, consists of a small plastic trough containing a cellulose sponge. Approximately four ounces of the activator solution are poured into this tray—enough to wet the sponge with a little excess. More activator must be added from time to time as the solution level goes down through use or evaporation. The tray is easily removed for cleaning, with little danger of spilling. This is well because, according to the Filmac representative who has supplied me with machines and materials, the activator will stain. He has occasionally spilled it on a white shirt and, in his own words, he has found nothing that will remove the stain.

The machine is simplicity itself to operate and lends itself readily to a self-service type of operation. In furtherance of this idea, one office machines company—the firm of Bodine, Bryson and Rolling, Inc., of Birmingham, Alabama—has equipped a Filmac 100 with a coin-in-the-slot attachment which operates on twenty-five cent pieces. This machine is in use on a self-service basis by patrons of the public library in Anniston, Alabama. For the benefit of others who may be interested, the company is prepared to furnish all necessary parts for this modification for $75 dollars, or can arrange for complete installation through any local Thermofax Sales Office for a total cost of $105.00.

While the Filmac 100 functions very well indeed in terms of simplicity and economy, in terms of versatility, it leaves a great deal to be desired. Since the screen size is small and the magnifications are fixed, it is decidedly limited in its ability to handle the variety of microforms found in library collections. For example, the text of a sample page from *American Documentation* measures 9¼ inches in height. But, the height of the reader screen is only 8¼ inches. This means that, if the reduction ratio used in filming an article from *American Documentation* is compatible with the magnification of one of the Filmac lenses, the page can be reproduced on a single print only if it is reduced somewhat in size, which may make reading a bit difficult. To print the text at full size would require two prints, and this would not only make reading less convenient but would double the cost.

Also, if documents are filmed on the full 35 mm. non-perforate frame, sectional printing is unavoidable. Using magnifications of 7 or 9 diameters, four prints will be required to reproduce the contents of a single frame. With the 13 diameter lens, 8 prints will have to be made and, with the 19 diameter lens, 15 prints.

Groups of prints stored in file folders exhibit a decided tendency to curl. This is generally true of most photographic papers which have a coating on one side only, but on prints made on the Filmac reader-printer, this is accentuated by the weight of the metal foil and zinc oxide coatings on the microfilm copy paper used in the Filmac 100. Seventy sheets of this copy paper weigh a pound, while 70 sheets of 20-pound bond paper weigh 11 ounces and 70 sheets of sulfite canary bond, such as is commonly used for carbon copies, weigh but nine ounces. The copy paper used in the Filmac 100, therefore, weighs from half again to almost twice as much as the papers ordinarily used for office records.

Thus, like the Documat, the Filmac 100 works well enough as a reader-printer when printing from microfilms which are within the specifications of microfilms for which the reader-printer was designed. But, since library materials are of different sizes, different formats, and smaller type faces, microforms of such materials frequently are neither easily nor economically printed on the Filmac 100. The screen size is simply too small.

In terms of convenience to the user, the changing of lenses in the Filmac 100 leaves something to be desired. To change, say, from the 13 diameter to the 19 diameter lens involves nothing more than lifting one lens out and dropping another lens in place. But to change to the 7 diameter lens, the condenser lens used for magnifications above 13 diameters must be removed. When changing back to higher magnification lenses, this condenser must be replaced. This is accomplished by removing one screw, but this screw is in a rather inaccessible place. Some practice, and a bit of manual dexterity are involved in removing and replacing this condenser.

The list price of the Filmac 100 with one lens is $629.00. Additional lenses cost $66.50 each.

A classic example of the kind of frustration a librarian encounters in attempting to acquire suitable equipment is found in the Filmac 200-R. The first model—the Filmac 200—handled 35 mm. microfilm mounted in aperture cards. Eventually the 200-R appeared, which handles 35 mm. microfilm in roll form as well as film in aperture cards. This machine delivers a very good quality print, 18 by 24 inches in size, in a few seconds and at a cost of about 25 cents. Conceivably, such a machine could be quite useful as a reader-printer, both for reading and for making full-size prints from microfilms of newspapers. However, as a reader, it fails on two counts. Newspapers filmed one page per frame in the 1-A position (with the lines of text parallel to the short axis of the film) appear on the reader screen with the lines of text running vertically instead of horizontally. Since there is no provision for revolving the head of this unit, reading such a film is a little hard on the neck.

A print from such a projected image is, of course, perfectly satisfactory.

On the other hand, if the newspaper is filmed two pages per frame in the 2-B position at a reduction ratio that will fill the maximum available frame area, it is impossible to get a portion of the image on the screen at all, whether to read it or to print it. I was recently informed by a Thermofax sales representative that this problem can be overcome by adding a supplementary reducing lens to the optical system. How well this might work, I am not prepared to say. In any case, any standard-size newspaper would be substantially reduced in size, and legibility would be affected accordingly.

I want to turn now to an appraisal of one of the most interesting, and I regret to add, a somewhat disappointing reader-printer—the Ross Microreader. It is disappointing in that this is that *rara avis*—a microfilm reader printer which *was* designed with library microforms in mind. In the Ross Microreader, we have a machine designed to be a universal reader. It will handle not only all forms of microtransparencies—16 mm. microfilm, 35 mm. microfilm, microfiche—but micro-opaques as well, from a 3- by 5-inch microcard to the giants—the 6- by 9-inch Readex Microprint and the 6½- by 8½-inch Microlex sheets. An ingenious set of accessories is supplied to make it possible to handle this diversity of microforms.

As a universal reader, it works. One can read any microform on this device. But, as a printer, it exhibits a number of serious drawbacks. To make a print, the reader screen must be removed and replaced with what is called a photographic attachment, consisting of a metal frame, a sheet of glass, and a pressure plate. To focus the image for printing, a two-inch-square piece of ground glass is placed against the glass of the photographic attachment. A sheet of photographic paper is then placed against the glass and covered with the pressure platen. However, the light output of the reader is so low that only very high-speed photographic materials can be used. This means that the printing step must be done under conditions of virtually total darkness.

Secondly, the field of illumination is fairly even at a magnification of 18 diameters but, at lower magnifications—particularly at 10 diameters—the field of illumination is markedly uneven. Prints made at lower magnifications are overexposed in the center before the corners have received enough exposure to appear at all.

Third, the 6- by 7-inch screen is simply too small for the reproduction in a single print of a great many types of materials. For reading, the image can be shifted as needed. But for printing, more than one print will have to be made.

Fourth, the Ross Microreader shares, in common with the Filmac 100 and the Documat, all of the drawbacks associated with a small screen size and a limited range of fixed magnifications.

The reader, with a full complement of accessories for reading all types of microforms, costs $312.

Another internal projection device for printing from microforms, which has not been tested yet, is the Microcard Printer. This device is not a reader-printer since, unlike other devices, it does not have a reading screen. It has, instead, a view-finder somewhat like the eyepiece of a microscope, which is used to locate the desired image. In contrast with the universality of the Ross Microreader, the Microcard Printer is a totally specialized device. It was designed for the making of prints from Microcards and Microcards only.

To make a print, a Microcard is placed in a carrier and, by moving the card around while looking through the eyepiece, the desired page is located and positioned. The exposure button is then pressed and a latent image is formed on diffusion transfer negative paper. Following exposure, the negative paper is positioned with the corresponding positive paper and the two sheets are mechanically advanced through a processing tray and out to a compartment where they can be removed and separated. The entire operation takes approximately 45 seconds. The copies are positive, and the materials cost per copy is stated to be 12 cents each. The list price of this machine is $950.00.

Turning now to external projection reader-printers, the first we will consider is the Rollacopy, alias "Micromate." Despite what advertisements may suggest, let it be clearly understood that both of these machines obviously came from the same factory. This machine reminds me again of the "Art of Assemblage" show. A Federal Microfilm Projector (which is hardly more than a slide projector equipped with a roll film carrier for 100-foot reels of 35 mm. microfilm) has been mounted on a column so that it projects vertically instead of horizontally, as it was designed to do. This column has been mounted on a base board and, to overcome the problem of incident light, the light source has been increased from 150 watts to 300 watts. To disperse the heat of this hot projection lamp, a small fan has been added. To this has been added another manufacturer's exposure timing device and, for the processing of the prints, a Polymicro processing unit. A small easel with a hinged glass cover plate has been added to hold the sensitized paper flat.

A similar assemblage, which has a federal enlarger head instead of a microfilm projector on its column, goes by the name of the Federal "Instant Darkroom."

Since the head is movable on a column, the magnification can be controlled to any desired degree between 4 and 12 diameters. To make a print, the microfilm is first placed on a spindle and tracked through a pair of glass flats to a take-up reel. The projection lamp is then turned on and the image scaled for size and focused on the easel. A sheet of sensitized paper is then placed in the easel and the exposure made. Following exposure, the sheet is then passed through the Polymicro processor.

Since the sensitized material is face up during the course of the exposure, room lights must be dim. Exposures with one brand of paper—Polyclair Slow—from a microfilm having an average background density of 1.20, were 12 seconds on the average, with the lens at maximum aperture. However, the optical system is such that definition at the extreme corners is not as good as in the center when the lens is at full aperture. A sharper print could be obtained if the lens aperture was stopped down to the next smaller opening, but this increased the exposure to 24 seconds. Had a still smaller aperture been required to ensure adequate sharpness, the exposure would then have been 48 seconds, which would have required very dim room light indeed if serious fogging was to be avoided.

In addition to the problems of over-all sharpness and exposure versus ambient light conditions, a number of other problems were encountered. In the first place, the mask in the film carrier has rounded corners instead of square ones. Square corners would permit the entire frame of 35 mm. microfilm to appear on the easel. The rounded corners cut off a part of the full-frame image.

Second, the focusing mechanism is somewhat crude in construction. As the lens is rotated for focusing, the image shifts laterally. At higher magnifications, the general shakiness of the projector on the column makes the whole image move each time the lens is turned. This makes focusing rather tedious and difficult.

Third, the projection lamp gets quite hot when left on for any length of time, time such as might be required to locate a particular frame in a roll of film. One further design fault is in the spindles which have handles on the back of the film carrier and which work at a one-to-one ratio. Turning through a full roll of microfilm becomes awkward and time-consuming and, at high magnifications, the image is constantly jarred by the action of turning the spindles.

The Rollacopy, marketed by the Andrews Paper and Chemical Company, lists at $395.

The French "Universel" is basically a microfilm reader to which has been added an easel for holding the sensitized paper and a stabilization processing unit. When used on a table top with the easel, the maximum magnification is only 10 diameters. The focal length of the lens is not great enough to cover a full frame of 35 mm. non-perforated microfilm and the alignment of the components of the optical system is not true enough to provide an image which is sharp both at the center and edges without some degree of distortion. A second problem occurs in setting the mirror for the three different magnifications. The mirror is mounted by means of two screws with knurled heads which permit the angle to be changed at each of the three different magnifications. Not only is the adjustment of the mirror for optimum sharpness not easily done but the two-screw system of locking the mirror in place is not positive enough. Unless the positioning of the mirror is done with great care, it tends to slip out of position by its own weight.

The brightness of the projection lamp is sufficient to permit the use of relatively slow papers under reasonable conditions of ambient light, but with negatives of high background density, exposures tend to be too long for maximum efficiency. Print making can be speeded up considerably if room light is reduced to permit the use of higher speed papers.

The steps involved in making a copy are the following: The microfilm is threaded into the machine and the desired image focused on the easel. A sheet of sensitized material is then placed under the easel glass and the exposure made by means of an automatic exposure timing device. The exposed sheet is then passed through the stabilization-processing section. The "Universel" is the only stabilization-process machine tested which has an automatic replenishment system for maintaining a constant solution level. Its optical faults, however, and the difficulties one encounters in making the necessary adjustments to achieve a clear, true image of the proper size make its usefulness rather limited. Its list price is $475 plus duty and shipping costs.

With the advent of small, rapid, and relatively inexpensive stabilization process equipment and materials, another possibility suggests itself: Perhaps such equipment could be used in conjunction with other microfilm readers to make them into reader printers. This is certainly a possibility; but it is likely, with many existing microfilm readers, to be unsatisfactory simply because the requirements for reading and the requirements for printing are different. The chief stumbling block will be in the evenness of the field of illumination. Such a situation is exemplified in tests made with a Recordak MPE reader. The projected image is brighter in the center than it is in the corners, but this does not interfere with the reading of the image. A print, however, of such an image, may be quite uneven, especially if high-contrast photocopy paper is used. At an exposure which will reproduce the center (brightest) area satisfactorily, the corners may be too faint to read. At an exposure suitable for reproducing the corners, the center may be heavy and filled.

Tests were made with both a stock MPE reader and with an accessory called the Fairfax Platen Elevator. The MPE reader works at a fixed magnification of 19 diameters which often produces an image much too large to print. The purpose of the Fairfax Platen Elevator is to shorten the lens-to-subject distance to decrease the size of the image. The device consists of a metal platen mounted on an X-shaped frame, which can be expanded or closed like a scissors. At its maximum extension, it decreases the magnification from 19 diameters to 13 diameters. But, regardless of the magnification, the unevenness of the field of illumination caused difficulties in obtaining satisfactory prints.

The last reader-printer I want to talk about is one which has not yet been tested because it is new, it is not in mass production, and it is quite expensive. This is the Filmac 300. The machine is capable of many things which other reader-printers are not. In the first place, it produces an image up to 11 by 14 inches in size. By means of a set of masks, any size smaller than 11 by 14 inches can be produced. Secondly, the magnification of the image is controlled by a set of movable mirrors which make possible a continuous range of magnifications from 8 to 20 diameters. The process by which the print is made is the same electrolytic one employed in other Filmac readers, and the cost per print is in the same proportion. Its special features are highly desirable in a reader-printer, but the list price of this machine is $3,600.

At this point, let us consider what the desirable features of a reader-printer for library use would be.

In the first place, screen sizes of 7 by 9¼, or 7 by 8¼, or 6 by 7 inches, such as are found in the Documat and the Filmac 100 and the Ross Microreader respectively, are too small. The screen size of a reader-printer for library materials should be at least 8½ by 11 inches, and preferably larger, for the printing of quarto-size serial publications whose dimensions may be slightly larger than 8½ by 11 inches. In the second place, full control over magnification is a necessity, since library microforms are filmed at reduction ratios which are not standardized and may vary over a wide range. Ideally, the process employed should be a completely dry one, such as Xerography or Electrofax. Unfortunately, machine costs with electrostatic processes such as these are likely to be quite high, although materials costs will be relatively low compared with most other processes. The operation, of course, should be strictly push-button. There should be no setting of mirrors, column heights, lens apertures or exposures. The print should be a clearly defined black-on-white image and should be permanent. Needless to say, no such machine exists at this time.

A significant analogy exists between the situation with respect to book copying equipment and reader-printers. In each, there are one or perhaps two machines which are superior to all others in most important respects. In book copying equipment, the Xerox 914 machine is probably the best suited to the needs of librarians. Pending future tests, it appears quite likely that the Filmac 300 is the most promising of the reader-printers. But, look at the costs—high monthly rental for the former and a forbidding list price for the latter.

This situation reminds me of an incident which occurred last year when I attended the first Grand Prix race for sports cars ever held in the United States. This was an impressive show, with drivers of international reputation competing in some of the finest machines ever produced. One active participant in the sports car racing scene is a millionaire sportsman who sponsored a racing Jaguar car and retained one of the best drivers in the business to race it. I was standing talking to a turn marshal when this man's entourage arrived at the race course in a huge moving van. In this van, there was not only this marvelous automobile but enough spare parts to take care of any problem, tools beyond number, and a complete crew of highly skilled mechanics whose job it was to make that care perform as perfectly as possible. Well, for a great many years, power, speed, and performance in a racing car were a matter of engine size. Engine size—known as displacement—was expressed in terms of cubic inches in this country and cubic centimeters in Europe. And for many years there was a proverb which stated the situation quite explicitly. This proverb was: There is *no* substitute for cubic centimeters.

As the turn marshal and I watched the unloading of this expensive automobile from the expensive moving van and saw all of the expensive parts and tools, and the expensive personnel, he turned to me and said: "Man, Oh man, there is *NO* substitute for *cubic dollars!*"

QUESTION: Has Mr. Hawken any recommendations for the purchase of a printer if you already have a reader-printer? Is there any machine available that does nothing but print from microforms?

MR. HAWKEN: Of course, prints have been made from transparent microfilm for a long, long time but it has always been a darkroom operation. It is perfectly possible to make prints with, say, stabilization materials, used in conjunction with a photographic enlarger. There is one machine in particular which has been made for this purpose. It is made by the Omega people. The machine has a very high-intensity light source and could be used under ordinary conditions of room light. The cost of this particular enlarger is fairly high, somewhere in the neighborhood of $500 to $600. So long as the room light can be controlled, any adequate 35 mm. enlarger could be made into a printer and used with stabilization materials for rapid print production.

QUESTION: At the present stage of development, would it be better for a library to do without, or to use one of these book copiers with all of its inadequacies?

MR. HAWKEN: This will depend to some extent on how pressing your need is. I have been fairly critical of a good many of the contact-reflex book copiers and certainly they don't do the job that the Xerox 914 does, but one thing which I think is important to keep in mind is that, despite the deficiencies they may have, they are still so far, far ahead of any former system for making copies—that is, the old darkroom system. It is a case where half a loaf is very definitely better than none, and the advantage of being able to make some sort of copy quite quickly and quite inexpensively is something that is well worth taking advantage of. So far as future equipment is concerned (and this entirely a guess), we might wait for six months for an improved book copier, or again, it might be another three years; so it's a gamble.

QUESTION: I recall an article in *Special Libraries* about ten years ago in regard to a Dutch manufacturer who was going to, or had already produced a portable microfilm reader to sell for $35. I wonder if our speaker has any knowledge of it, or if anyone here knows anything about it.

MR. HAWKEN: That was very happy news when it was announced. Incredible! Thirty-five dollars! I think the current price of that reader is now approximately $100 higher. The situation has happened more than once in which a small, fairly efficient little machine is brought out in Europe, and, by the time it gets to the United States, something happens. The last instance I recall was a French reader which was to sell for about $65 and, when it got to this country, it was $235. So at this moment I know of no microfilm reader that is going to sell for $35.

MR. POOLE: I might add that the reader referred to was the Dagmar, which is on display here. There are two models. They sell one for reading microfiche, that is, the card-size transparency; they sell the same reader with two small, simple arm-like attachments for holding 1-foot reels of microfilm. If you would like to see the latter machine, it is on the table in the back, left side of the exhibit hall. It is a very simple and, as Mr. Hawken indicated, not very efficient arrangement. It is sold in this country by an organization in Chicago known as Audio-Visual Research.

QUESTION: Is there at the present time, any equipment using the stabilization process which could be put on the easel of an enlarger?

MR. HAWKEN: Yes there is: the polymicro-processing unit, which is used in the Arcor machine and may be purchased separately, the Photorite Company (which has offices in Chicago) manufactures at least two sizes of the stabilization processors. The companies supplying either of these machines supply an extensive line of papers, ranging from contact-speed to very high-speed enlarging papers, and also in different weights and different surfaces.

QUESTION: Could the Documat reader-printer be mechanically modified without too great a cost so that it would provide full scanning up to the edge of the image area?

MR. HAWKEN: It doesn't seem to me that it would. The arrangement is a case in which the scanning device moves out from a U-shaped affair which holds the lamp house, and the casting and the mounting of the casting are just a little too far in. I would guess that it could either be cut out a little bit or moved slightly. That could be accomplished without too much trouble. It would entail deepening the furrow just a little.

MR. POOLE: Any other questions? Again, let me thank Mr. Hawken on behalf of all of us for his two very interesting and very informative presentations. Before we leave, let me remind you that we will have the last session of this Institute in this hall at eight o'clock tonight. We would like to have those of you with specific questions, questions you would like to have answered by our panel of eight or ten experts, bring those questions in written form. We will collect them at the door as you enter and will try to have our people provide you with answers. We will also have questions from the floor after the written questions have been answered.

• 7 •

PANEL DISCUSSION:

A Catch-all Question-and-Answer Period on Library Equipment

The final discussion meeting of the Library Equipment Institute, held at the Otto G. Richter Library, University of Miami, Coral Gables, Florida on Saturday evening, June 16, convened at 8:00 o'clock, William Geller, moderator; Forrest Carhart, Hoyt Galvin, William R. Hawken, Homer Lombard, Keyes Metcalf, Frazer Poole, Edward G. Stromberg, Hal Syren, Joseph Treyz, Martin Van Buren, and Edna Voigt, panelists.

MR. GELLER: I think that never before in the history of the American Library Association have we had such an array of intelligence, talent, and experience. Collectively, this represents literally hundreds of years of experience.

Thank you for your written questions. We have some most stimulating ones, and we will now get into the work of the evening.

I should like to start out by asking Mr. Hawken a question. Should libraries reverse their policy of buying microfilm for use in readers and, instead, purchase negatives, if possible, for use in prints?

MR. HAWKEN: I think this question stems from an idea which is quite widespread; that is, that the quality of prints made from positive microfilm is inadequate. This is really not so. The positive film does produce a print which is greyish and which is not terribly attractive, but so far as legibility is concerned, it is very satisfactory.

If you want to try for higher quality (which comes from a negative), you can figure that any positive you buy will cost you twice as much because, from that positive, you are going to have to have a duplicate negative made, and I think that unless you are really dissatisfied with the appearance of the print—not considering its legibility—this would be wasteful.

MR. GELLER: Mr. Galvin, why do circulation desks need to be as wide as they are? Unnecessary width provides more space underneath in which to collect dirt and miscellaneous items. Why, for example, to be specific, is the University of Miami circulation desk so wide?

MR. GALVIN: I don't have any real answer for that second question—why the University of Miami's circulation desk is so wide. Frankly, I see no real reason for them to be so wide. Somebody was talking last night about the height of circulation desks, or perhaps the depth. I do not think they need to be as wide as the one at the University of Miami. I think a narrower one would serve just as well, because, ordinarily, the transactions that take place at the circulation desk are relatively brief.

MR. GELLER: Mr. Metcalf, would you like to comment on this?

MR. METCALF: I haven't any idea why the desk here at the University of Miami is so wide. It is 43 inches high, which is unusual, and I think that is very good. The lower the desk is, the wider it needs to be, to keep the readers from bumping noses with the staff attendant; thus, if you have it 43 inches high, it needs to be only 22 or 23 inches deep unless you want it deeper to put things in, and I don't like to shelve my books too deep.

On the other hand, if the desk were made shallower, we would have to ask the manufacturers of depressible book trucks to make them narrower, so that the truck wouldn't stick out, causing people to bump into it as they walk past. In general, I see no reason for a desk to be that deep. It costs more, and I think things tend to accumulate.

MR. GELLER: On the reverse side of this question, there is another, which I will address to Mr. Syren:

It says, "When I buy living room furniture, I don't find brass or aluminum name plates on it. When I buy kitchen appliances, I do. Library furniture supply people often seem to look upon their furniture as though it were similar to kitchen appliances. Granting their pride in their products, would any of them accept the notion that the placement of their name plate is often in poor taste? If the furniture supply people do accept this notion, why do they use name plates? If not, are there librarians who agree with me?"

MR. SYREN: I have been accused of providing furniture in some libraries that didn't have our name on it. One reason we identify a piece that we make is that we like to have people know where it came from. We are proud of it. Now, of course, there are people that might object to having our name on their furniture; in those cases, we are glad to omit the name. But, generally, we have had no serious complaint because of a label on the piece. The label acts as an identification. If, for example, a library is furnished at a certain time, and additional pieces are bought later on, it is a help to know that the original furniture came from a particular supplier. We are proud of our furniture and that is why we put the label on it. However, to repeat, if you don't want a label on your furniture, you certainly don't have to have it.

MR. GELLER: Mr. Van Buren?

MR. VAN BUREN: I do believe—and I have made these comments before—that librarians who have the problem of investigating equipment and furniture of other libraries to see what has been good and what has been bad should be able to find some identification. If they find a certain piece of equipment that especially suits their condition and is appropriate to their own library, I think they ought to be able to find out where it comes from. I see nothing at all wrong with putting a label on it. Every store does it; every refrigerator manufacturer does it; every automobile maker does it; and I think it is rather beside the point to make the identity of any firm's product—a product of which the firm is proud—too obscure.

MR. GELLER: This one is for Mr. Hawken. What make of Microcard reader would you recommend for immediate purchase?

MR. HAWKEN: There are several good Microcard readers on the market. It is really a matter of taste and the cost of the machine. There is the Microcard Reader Mark VII. This is a machine which has the glass screen (which you look at) illuminated. There is another very good one, The American Optical, and it projects in the flat surface.* Beyond that, it is a choice which depends on your taste and the costs of the machine.

MR. GELLER: The next one I will refer to Mr. Metcalf. Should library chairs be purchased on the basis of appearance, or novelty, or utility? In other words, which is more important: patron comfort, or the aesthetic interest of the librarian?

MR. METCALF: I wouldn't want to buy a chair unless it answered satisfactorily four questions: Is it comfortable? Is it steady, so that it will wear? Is it good to look at, and is it inexpensive enough so that I can afford it? You've got to consider all four of those points, and then do the best you can. You certainly don't want an uncomfortable chair. You certainly don't want one that will fall to pieces in a few years; you certainly don't want an ugly one; and you don't want to pay a hundred dollars for it if you can get it for twenty. As to which is the most important, you've got to examine the situation in your own library, taking into consideration your own pocketbook and what you think your readers want.

MR. VAN BUREN: I must repeat the comment of the Roman architect Vitruvius of some 2,000 years ago, a comment still valid today. It had to do with architecture, but it is just as applicable to equipment and furniture. There are three basic elements to consider: function, durability, and beauty. And you cannot take one or even two without an assessment of all three. I had hoped that I might have made that point strong enough the other night.

MR. GELLER: This next question I would like to address to Mr. Lombard. Would you recommend "wall attachment in shelving" and, if so, under what circumstances?

MR. LOMBARD: I would recommend attaching wall ranges to the wall. It is the usual practice, and I know of no reason why it shouldn't be carried out.

MR. GELLER: I will start the next question out with Mr. Galvin. In writing specifications for new buildings, librarians have the aid of, or depend on, architects, but ordinarily, in writing specifications for furniture and equipment, librarians are on their own. Without a consulting specialist, just what steps should a librarian take in writing specifications for furniture and equipment?

MR. GALVIN: Well, Mr. Syren's suggestion to us last night was that you certainly should get a consultant. It is hard for me to understand why consultants are so often difficult to acquire. Perhaps it is the case that governing bodies and college authorities regard furniture as of no great consequence; they may regard it as easy to buy, in short, a simple matter. They consider the services of a consultant to be unnecessary and, as a result, you are unable to get one. In contrast, those in authority have accepted the idea that a library needs an architect. Although, in total volume, there is not as much money involved in the furniture and equipment as in the building, we all know that the furniture and equipment are very important. So, first, I want to evade this question in part by saying, "Don't give up on getting a consultant." As I mentioned last night, consult your attorney—city attorney, county attorney, whoever it may be—to be sure you are clear on the legal aspects of your specifications. If you are unable to get consulting services in any way, either through an independent consultant such as Mr. Van Buren or the consultants available through the equipment houses, then you are on your own; however, I can't quite see why you can't get help from such people.

You must make a layout for the furniture, in your building, and you must do it while the architectural work is going on. You must constantly test that layout against the building itself as it evolves in its various stages, as well as against the preliminary plans. All this time you should be looking at other libraries, other sets of specifications, to see and get ideas. (To Mr. Poole:) Do you have such specifications and ideas available as solutions to technological problems?

MR. POOLE: We do not yet, but we are working on them.

MR. GALVIN: They are planning to acquire a sort of "library of specifications" at the ALA Library Technology Project. I think this would be most helpful to you—to get such general specifications—because the language tends to be similar in all cases. You must remember, however, to relate them to the legal and other requirements of your own community.

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*Since discontinued.

If you are going to make the whole layout effective, remember that colors are important. The color scheme throughout must be coordinated with the ideas of the architect. This would include the colors of the floor, the walls, the ceiling, and any fabrics you might use. So, when you make specifications for such things, as sofas, you need to specify the fabric and its color. Here again, you take into consideration the three things that both Mr. Metcalf and Mr. Van Buren are talking about: durability, beauty, and function.

MR. GELLER: Thank you. The next question is addressed to Mr. Carhart. What device do you recommend to monitor necking and petting in the stacks at university libraries? Would you talk about public libraries too?

MR. CARHART: I think the best advice on this would be to adopt the use of large, convex mirrors such as those used in department stores, supermarkets, and similar establishments. With these mirrors, you can see around corners and you can observe the aisles to catch shoplifters; these mirrors are quite effective if they are properly placed.

MR. GELLER: Now, this is to Mr. Metcalf. Would you discuss lighting in reading room areas, that is, fluorescent lighting, which is used now in almost all cases?

MR. METCALF: I would like to make a comment on the previous question. Necking and petting can be a serious problem in college libraries, and there are various ways of taking care of it or helping to take care of it. An arrangement for individual seating instead of seating for two people helps. I know of at least one library where the individual tables have been made narrower than they should be for convenient use so that two people can't sit at the same table at one time, and there are other methods such as that.

To go on to the present question: I don't quite know what is wanted. Would you discuss lighting in reading room areas? Are fluorescent lights being used in almost all cases now? In a large percentage of cases, incandescent lights are still being used. In some cases, there is a combination of incandescent and fluorescent lighting in order to get a somewhat different effect. There are some lighting experts who tell us that such a combination provides better light than either one alone. Some librarians, realizing that there are still some people who dislike fluorescent lights and who say that it puts a strain on the eyes and makes them nervous, will have one room in the building with incandescent light, so that the readers who don't like fluorescent light can have the other kind. When the Widener Library at Harvard was relighted a few years ago, we left one room with the old light. I confess I don't know that anybody goes there because he prefers the incandescent lighting, but people do go there, because that is the room they want to use.

I think you can get high-quality light with either one. You can get high intensity with fluorescent light with somewhat less wattage. On the other hand, the fluorescent fixtures and tubes cost more than those for the incandescent, and which is more economical to use will depend largely on the cost of electrical power in the particular place. If your current is very expensive, fluorescent light would seem to be indicated; if it is very cheap, you might use the incandescent light.

The incandescent light creates more heat for the light that it gives and, if you suffer from the heat and can't have air conditioning, fluorescent light is indicated.

MR. GELLER: Thank you. I would like to address the next question to Mr. Hawken. What inexpensive photocopy machines for bound volumes are relatively trouble-free and simple enough for self-operation by college students?

MR. HAWKEN: "Inexpensive; relatively trouble-free; simple enough for self-operation by college students." There is exactly one. That is the Docustat which is exhibited here and which takes a 25-cent coin for operation. Anything else—any other machine—would have to be supervised and maintained by the library staff. This machine is maintained by the agent who installs it, and it is just about the only machine that meets this particular set of specifications.

MR. GELLER: Thank you. The next question I would like to address to Mr. Poole. Have there been reports of the use of carpets in any libraries?

MR. POOLE: There have been a number of libraries that have installed carpeting in the last three or four years. Although this is too short a period for any real evaluation of the effectiveness and economy of carpets, the librarians who have installed carpeting up to the present moment, are enthusiastic about them.

The University of South Carolina, finished in 1958, installed carpeting throughout. In California, the Arcadia Public Library and the Santa Ana Public Library both have carpeting throughout, or in almost all areas. Shaker High School in New York has an almost completely carpeted school. Included are the library, the classrooms, the corridors, and, I believe, everything except the laboratories. There has been a tremendous interest in carpeting in the last few years and, in response to many inquiries, the Library Technology Project has prepared a six-page mimeograph leaflet which describes the experiences of several libraries and gives preliminary cost data, and sample specifications for carpeting, as well as a bibliography on carpeting. We will be glad to send this free to anyone who wants it, or it can be picked up at the LTP booth in Miami Beach.

MR. GELLER: For this next question, I would like to solicit a three-way answer, starting with Mr. Carhart and then going to Mr. Syren and Mr. Metcalf.

What are the fundamental features which should be built into a loan counter for a college library? I am assuming this means a circulation desk.

MR. CARHART: What you build into the counter depends on what you are going to do in the way of a circulation control system. One of the things that we found in the recent study of circulation control systems is that, in general, a hand method of charging and discharging books is more economical for libraries than any known machine method. If you want to follow only the four minimum requirements for circulation control—that is, the four minimum objectives—you can do this in a college library by hand as economically, in fact, more economically, than by any machine method. There are *five* minimum objectives for a college library, because college libraries want to know where books are when they are not on the shelf. If you are planning on equipment, then the desk should be designed around the equipment (the equipment that you are going to install) or it must be modified to suit that equipment. That is a very generalized answer but, not knowing what equipment you might be talking about, I can't say much more than that.

MR. GELLER: Thank you. Maybe we need some illumination from the audience. Would the person who asked this question, could he explain the question further? Then we could try to tie it down.

SPEAKER FROM THE FLOOR: I asked the question because, when you look at the equipment exhibited by different companies, you find that it is made up of simply a group of boxes. I wonder what the equipment companies have in mind when they put out the circulation desk and loan desk with numerous shelves and covers and perhaps some wells for cards and so on. I am inquiring about the fundamental elements that ought to be in a loan desk; Mr. Carhart has answered that in part.

Of course, I recognize that the desk should be built around the equipment you are going to have, but with respect to a lot of the items we see on display and in the catalogs, the manufacturers don't seem to have that in mind at all.

MR. GELLER: This is somewhat related to the question of custom-built vs. standardization. Mr. Syren, I think that your experience has led you to hold that there are certain elements which should go into a circulation desk.

MR. SYREN: Well, it is a pretty hard question to answer unless we know exactly the amount of space you are going to allocate in your circulation area for a desk. How much passageway must you allow for people going back and forth? You've got to decide for example, whether they are going to use the pneumatic tubes and whether supervision of the tubes should be centered at the desk. You should take account of the telephones to be installed there.

Basically, the desk we show in a catalog illustrates only the units available and which can be ordered by a number. I would say that no more than 50 percent of the desks that we make or have made in the past can be ordered simply from the catalog. I think there are always some special features that have to be built in for a particular college library. To go further: You must determine whether you are going to have your books returned at that desk or whether you are going to handle your reserves there. There are so many unknown factors to consider, it is awfully difficult to give you a simple outline and say this will be a desk for your library. I just couldn't do it without knowing more of your problem.

MR. GELLER: Mr. Metcalf?

MR. METCALF: Mr. Syren has already indicated that it depends on what you want at the desk, what charging system you use, whether you have the reserve book desk there, how busy the desk is going to be, and how much space you have for it. I will say that at the Widener Library at Harvard which is a big central library with a very, very busy desk, that desk is only 13 feet long. There is no way of making it any longer, either. So, anything that we can't do at the desk—things the rest of you may do there—we do behind the desk at another place, just as readily. You can adapt your space to the needs. As I said earlier, I would make the desk high enough so that a person sitting on a high stool would have his eyes on the same level with the standing customer. I think this is very important. I don't think that the library attendant who sits down ought to have to look up in order to see the person he is serving. If the attendant is going to sit down on a high stool, he's got to have a knee-hole; so I am sure that there is at least one thing you should have in the desk. In general, it does depend simply on the space that you have and what you want to do with it.

MR. GELLER: Thank you. I think Mr. Van Buren also has a comment.

MR. VAN BUREN: I have heard people saying, "Well, it depends on what you want to do with it and how you want to use it." The gentleman in the audience said, "Well, so far, the standard catalog presents nothing but a series of boxes with various sorts of inserts." That has been a bone of contention for me for some time, and I have a feeling that that is one of the greatest weaknesses of library development today. Our card catalog modular segments are made today almost precisely the same way they were made in 1901, and I maintain that it is time to repeat what I said the other night, for a renaissance in thinking. I think it is possible to make a modular lending desk, which will have component inserts, and which can be adapted to the purpose without breaking those boxes down and rearranging them and so on, and of course, this is one of the arguments of the manufacturers of the segment boxes which make up lending desks: they can be rearranged. It is true that they can be unbolted and you can put one on this side and one on the other side and so on, but I question how many times in a library's existence this is actually done.

I think the problem is actually in an embryo stage. The idea of the lending desk, which is certainly an important, if not vital element in any library, has yet to be properly conceived, even with the processes that we have today. This is not even to speak of electronic and other systems which should be in existence today and which, perhaps, should have been in existence ten or twelve or fifteen years ago. We are already behind the times, and we are not even catching up with those items.

In short, I am extremely critical of the basic assumption of the flexibility of lending desk components today in their modular design concept. Again, to repeat what I have said before: this happens to be my own opinion.

MR. GELLER: Miss Voigt?

MISS VOIGT: What Mr. Van Buren has said, of course, has been true of all wood desks. However, I do think that a great leap forward has been made when we combine metal with wood. There is now a desk available that is more flexible than anything heretofore. One of the problems of an all-wood desk construction is that you must fasten your uprights together at certain places. For instance, it was never easy to eliminate all equipment from an end unit so that you could put a book truck in it. Now that we have this new construction, it is possible to remove the equipment from any unit in the desk without unbolting the front of the desk.

You can leave the desk completely empty for roll-under equipment, such as typewriters, visible indexes, book trucks of any kind. One of the criticisms of the old wood desk is that you had to crawl inside to get the books out of the back. With this new construction, you can have a floating upright in there. You can use a standard shelf from your steel book stacks and install it so that the face of the shelf is flush with the inside of your desk. If, on the other hand, you want to insert some card units, or even letter-size or legal-size files, you can put in two shelves, one in back of the other. They will support these deeper units—anything up to 24 inches. I think that if you haven't seen this, it is worth looking into.

MR. GELLER: Mr. Poole and I have been exchanging ideas on this too. Did you know, for example, that the manufacturers will build to your specifications and your special needs? Would you like to return to this, Mr. Metcalf?

MR. METCALF: I don't believe Mr. Van Buren has any idea of the work that librarians and the equipment firms have put in on this problem and the changes that have been made in the past generation. I think it's fair to say that in many, many university libraries and public libraries, we are able to carry twice the work that we were able to carry a short generation ago, and this is because we have made changes. Then, I would like to bring in an entirely different point: Probably more importance than the arrangement of the desk is the need for a good housekeeper standing back of it.

MR. GELLER: Since I gave Mr. Metcalf a chance at rebuttal, I will have to give Mr. Van Buren a rebuttal.

MR. VAN BUREN: I have offered some rather severe criticism perhaps, but I don't mean it in any bitter sense. If I have been critical, my intention is only to try to spur the manufacturers on further than the developments that they have been making. I am not denying that they have been making progress. I do know that the feeble little efforts that I have made on my own (with precisely what Miss Voigt talked about—that is, with little inserts and so forth)—without a shop, without a manufacturer, with just a few drawings, spending something like a thousand dollars out of my own pocket for no future gain of my own—have produced some startling results. Patent attorneys in Washington have indicated (and I have a ten- to fifteen-page report on this) that no patentable developments have been made in that direction since about 1903. Now that is the only answer I have to give. If all of those developments have been made and if they are truly revolutionary and constitute improvements, I am a little bit surprised as to why there are no such new patents on file. I think it is up to the manufacturers, if they are really sincere, to develop these things to such a point that they at least are original enough to be patentable.

MR. GELLER: This is addressed to Mr. Hawken. In your opinion, how necessary would a microfilm reader and/or a photocopy machine be for the library of a two-year college, which, at the present time, has a library budget of $23,500, including salaries, a student body of 700 to 750, and a collection of 17,500 volumes? The student body is expected to grow to 1,000 by 1965.

MR. HAWKEN: That is a good one. I think the answer (taking off from an answer Mr. Syren gave recently) is that this has too many imponderables in it. The need for a micro reader and/or a photocopy machine simply stems from the requirements of the particular situation. If you have micro forms, you are going to need some equipment for reading them. If you have a demand on the part of your students or faculty for photocopies, then you are going to need a photocopy machine.

MR. GELLER: This next one is addressed to Miss Voigt. When is the proper time to call in a consultant? Is it ethical to use the services of a consultant from a commercial firm when you cannot guarantee to give him any business?

MISS VOIGT: A consultant should be engaged in the project when the plans are in a fluid stage, before the engineer's work has begun. It will be very expensive if you try to make changes after that. It is important to test your layout with the furniture. Sometimes very minor things are suggested, such as the moving of a door or a window, and these may help tremendously in achieving greater capacity.

Manufacturers have offered—and I think it is all right to go into this—a fee-agreement plan, just so you will not be obligated to the one manufacturer. The plan works like this: In the first place, let me say that doing a complete job sometimes requires work over a period of years. Very often, it will require two years between the time the plans are started and the time that the specifications go out for bid. No manufacturers could risk an investment of that kind, involving thousands of dollars, if he knew that it might be completely wasted. Therefore, a fee-agreement is offered whereby a certain sum is determined, generally a percentage amount, which represents a small percentage of the total cost of the equipment. The library or the architect agrees to pay that amount to the consultant, if his firm does not receive a large percentage of the order. In other words, it is not an arrangement intended to make a profit. It is an arrangement to cover the manufacturer's costs of consulting services if he should lose the order. In that way, a manufacturer's consultant can give you complete service and untiring effort.

MR. GELLER: Mr. Lombard, would you like to comment on this?

MR. LOMBARD: The ideas expressed regarding the paying of a fee for specifications has considerable merit. However, in the past, the thought has been largely that you, as a representative of a company furnishing library equipment, would furnish the data on the following basis: you hoped that you would create in the mind of the prospect the idea that you were a satisfactory concern to deal with, and, in fact, that he would like to deal with your firm because of the advice you offer and the checking you do on what had been recommended. That is, or can be, rather expensive, and I have sometimes felt that, where you do incur expenses and do not receive an order, in reality, all of the parties negotiating orders from you pay for it because you have no other way of charging up that expense. I do believe that the charge for that kind of service is something to be carefully considered by each individual library, and I also feel that a specification should be based on following a line that would permit competition and not exclude it. At the same time, I do believe that, frequently, the services you pay for is oftentimes better than given for free.

MR. GELLER: This next question is addressed to Mr. Poole. Would it not be to the best interest of the furniture manufacturers for libraries to agree on some common, minimum, standardized specifications which they could use as a basis for quality and, further, to produce such a certified list?

MR. POOLE: Let me answer this rather indirectly by saying that one of the objectives of the Library Technology Project has been to develop standards for library furniture and for library shelving. We have in mind the development of performance standards rather than manufacturing specifications. Two committees, sponsored by ALA under the general direction of the Library Technology Project, have been established within the American Standards Association in an attempt to do this very thing. I think that such standards should be developed by an outside organization such as the ALA rather than by the manufacturers. This is because the manufacturers would probably find that problems of competition would almost inevitably defeat such an attempt on their part.

This is not an easy project, and we have made relatively little progress with it. However, we hope—and I am sure that eventually this will come—to develop performance standards which will be useful and which will form at least a minimum type of specification. By "minimum," I do not mean that these will be at the bottom so far as quality is concerned. We would defeat our own purpose if we did.

Someone has asked (not in the meeting): Why the emphasis on performance standards? The answer is simply that, in this respect, we are not concerned with the aesthetics of furniture. We would, I am sure, defeat attempts to develop better-looking equipment or better equipment if we were concerned with the aesthetics of design. We are concerned only with performance—how well a table, chair, bookstack, or card catalog cabinet performs—not with how it is made. Perhaps one of the manufacturers would like to respond to this, too.

MR. GELLER: Mr. Syren?

MR. SYREN: Well, I think that Mr. Poole has covered this very well. But from a manufacturer's standpoint, I think that each one of us takes pride in what we are developing. For example, we feel that we probably produce the best catalog tray there is on the market. No doubt one of our competitors could say, "Yes, you've got a good tray, but I think we go a little further." So, I think it would be almost impossible for anyone to say that we are going to make a catalog tray and have everybody agree on it and everybody make it. I don't think it would be practical to do that, because then you take away the incentive of our company to develop something better, a better product that we could try to manufacture. The same thing would happen to the competitor. And this would occur with steel book stacks, both bracket and slotted styles. It is our intention to try to produce something that has characteristics which we feel are selling points; that is the reason for our development. We do produce, as Mr. Poole says, equipment that will perform according to the standards that ALA may set up. I recall that in Canada, several years ago, several manufacturers produced filing cabinets of a certain given size. But in the process, something was taken away. There were, I think, three manufacturers, and they made all the cabinets exactly alike so that they would be able to inter-member them. But the incentive of those manufacturers to produce, perhaps, a 24-inch file instead of a 28-inch file was removed. The point is that this is the reason why we in this country are outstripping most of the world; it is because we strive to produce something better, not simply try to be uniform and standardized. But that is what actually happens when you develop uniform specifications.

MR. GELLER: I have a rather complicated engineering question addressed to Mr. Metcalf; I have given it to him and would ask, since he has been sitting here digesting it, if he will read the question and then answer it, please.

MR. METCALF: Since your chairman said this was a complicated engineering question, I will start off by saying that I am not an engineer. The question reads as follows:

"Are there special difficulties related to going down more than one level below grade in providing for a library's space needs that would make this a second- or third-choice solution to a library space problem rather than a first?"

Circumstances alter cases. There is a note at the end of this indicating "New York area." Well, certainly, the area does make a difference. I am sure that here, outside, you wouldn't want to put more than one floor below the ground. I cannot speak for the New York City area, but for Ithaca, New York, in the university library, they would have been glad to have a sub-basement below the basement, which itself is below ground level. In that case, they decided not to put it in because they could not afford it. They ran into solid rock which would have been very expensive to remove. Thus, the decision depends first on the soil condition and the cost of making the excavation.

At Harvard, we have found that we could have a floor below the entrance level (if we planned just right) that would have some windows in it, and then we could have a floor below that, which would be a sub-basement, and then, in three buildings that have gone up in connection with libraries at Harvard in the last twenty-five years, we have a sub-basement, because that was the cheapest space we could find in that particular location.

The excavation was easy; it could be done with a steam shovel. The drainage problem was not serious, as it might be in some places. In part, the decision will depend upon the value of the land. Certainly, if this New York area mentioned by the questioner is on Wall Street, there isn't any question that you would do a sub-basement, and I suspect that there are buildings in the Wall Street area where space is worth I don't know how many dollars a square foot, where you go down four or five stories as sub-basement levels. I have been in New York City buildings with at least five sub-basements in which they have cafeterias, with a staff and other things, and they have useful space.

In a library, it will depend also partly on what you want to put in this sub-basement space. Some of us would hesitate to create large areas for use by readers without any windows at all, although I confess that in the Lamont Library, we have a room that seats 60 readers just inside the back door. Even though it is so low that it can't have windows, just as many readers go there as to the other rooms. The readers don't seem to care. In the sub-sub-level, in Lamont, two floors below this one I have just spoken about, we have space for 60 more readers, and the depth has never bothered anybody.

The space way down in the ground has some advantages, too. If you want to air condition such space, it is less expensive than up above because, when you get down ten feet or so underground, the temperature and the humidity conditions tend to remain the same the year around. In the sub-basement of the Houghton Rare Book Library, where we are very careful with the air conditioning, it is so well insulated that we have turned off the air conditioning for twenty-four hours and have not had a variation of even one percent in temperature or relative humidity. There are also some other advantages. If you have a five-level building and you can put two floors below ground and two above, you can perhaps get along without an elevator for the public. There are various things of that kind that need to be kept in mind. It just depends on the local conditions. As I said, circumstances alter cases.

MR. GELLER: Thank you. We have been jumping through the questions and we have quite a number of stimulating ones coming up, but I want to say at this point that, so far we have had none addressed to Mr. Treyz. I take this to be a tribute to his very fine coverage of catalog card reproduction systems.

The next question is addressed to Miss Voigt. Assuming that wooden book cases in an old building meet the test of function and durability, can they be treated or refinished in areas of a new building to meet the test of beauty? Could you discuss this in terms of cost and practicability and other factors?

MISS VOIGT: If you have some wooden book stacks now that are satisfactory, by all means re-use them. They can be refinished. In areas of the new building, it probably will be less expensive if you had a local refinisher who could do a good job for you; otherwise, there would be the expense of crating and re-crating and shipping charges, which are considerable. If you are going to buy some new equipment for this building and want to refinish the old stacks to match the new equipment, I think almost any manufacturer would cooperate, and perhaps, would sell you the matching stain and the finishing materials so that you could have a local man do it.

We recently secured an order for some furniture for a college library and we are doing just that for a smaller piece of equipment. It happens to be an atlas case; their janitor is qualified to do the work, and he is going to do it for them.

I might say that, if your stacks are now in a light finish and you want to make them dark, you will not have too much trouble. However, if they are in a dark finish and you want to make them light, that is more troublesome, because you will have to get the stain and so forth out of the wood.

MR. GELLER: Thank you. The next one is addressed to Mr. Hawken. What is the best reader for a 6½- by 9-inch microprint?

MR. HAWKEN: This question of "best" is always a difficult one. There are perhaps two or three readers that are good. Microprint makes one themselves. The American Optical reader will also accept that size. Both produce a good, clear visual image on the screen. They vary somewhat in price, and also in the way they are operated. There is no one "best" reader.

Again, it will have to be decided on the features that you like in a particular reader and also on the basis of how much money you want to spend. The next question is addressed to Mr. Metcalf. How much illumination is needed in stacks and reading rooms?

MR. METCALF: I don't think that this is a fair question. I am a prejudiced party. If you go to the Illuminating Engineering Society, you can get their standards. They will say, or did say 15 years ago, that you ought to have 35 foot-candles. If you ask them today, they will say that you ought to have 70 foot-candles. They tell me that if you have occasion to ask them a few years from now, they will say you ought to have 100 foot-candles. I can't quite understand that, because I think that the human eye takes longer than a generation to change to that extent.

As I said, I am a prejudiced party and I prefer to go to the eye specialist to see what he says. I have gone to the best eye specialists I can find in this country, and they have said that the human eye is a very, very adjustable organ. It can stand, without any harmful results, not only 70 foot-candles or a 100 foot-candle, but 500 foot-candles. We have a good deal more than that right here in Miami and Coral Gables, if the sun would only come out. The specialists also say that the eye will not be damaged, if you have only 10 foot-candles. It may be a little more strain, they say, but it wouldn't do you any harm.

One expert has told me that anything over 20 foot-candles doesn't do you any additional good. He has told me that for publication. He has said—and I am not going to name him on this account—that, actually 10 foot-candles are entirely satisfactory. Now, I've got more to say than that, however. I am sure that my eyes and your eyes are not the same. I am sure that some of us need more light than others, and that reading catalog cards with handwriting on them and old manuscripts, scribbled in pencil, calls for higher intensity than is needed for an average book. I see no reason why there shouldn't be more light in some parts of the building than in other parts so that when you have to read something particularly difficult, you can find higher intensity. In that connection, I suggest that if you have your entrance lobby lighted less brilliantly than the rest of the building—not more brilliantly, as some of us tend to have it—you will be fooled as you go into the reading room; it will look brighter and you will think you have plenty of light.

We have done that at Harvard and we have found that 20 or 25 foot-candles are entirely satisfactory for almost all use.

It really isn't the intensity at all that counts; it is quality, and if you have the right quality, your eye will adjust to whatever it is. I would like to add another point: What do you want to pay for it? If you have 100 foot-candles of light, it will cost you just five times as much as if you have 20 foot-candles. One more thing, which I am sure is very unwise: When the University of Miami gets its lighting bill for this building for a year, they are going to be in for a surprise.

MR. GELLER: There is another question here on carpeting. This is a red-hot subject. I would like to ask Mr. Van Buren and Mr. Poole to comment on this one. I should like to hear comments on the use of carpeting as floor covering in libraries either over-all or in certain areas. Mr. Van Buren?

MR. VAN BUREN: There has been an awful lot of talk about carpets, about rugs and other types of floor coverings. The Carpet Institute has instituted a series of tests starting about three or four years ago, and they have a great many documents available—conclusive tests of this and that. They did a number of tests in public schools in Texas. Those documents are available from the American Carpet Institute or from any of the leading carpet manufacturers, and I think they are worth studying.

We have used some carpeting in libraries and I have seen it in other buildings. A few years ago, banks were very reluctant to use carpeting and now it is a common floor covering in banks. They are thoroughly sold on it. Personally, I still remain on the fence.

Now, we do use open-area rugs and we use them consistently, and I thoroughly believe in them for a variety of reasons. Number one, an area rug will, for example, define a lounge grouping of furniture. In contrast to this, where you have hard-floor covering, you may decide that you want furniture arranged in certain groups—perhaps a sofa, coffee table, or something else here and there. But, by the end of the day, those pieces of furniture have been moved around so much that the whole concept of the room arrangement is lost; it looks like nothing more than a jumble.

The area rugs serve the purpose of holding those furniture groups together. As most libraries are planned today with large reading areas in which the furniture is arranged to achieve a certain psychological or symbolic effect, the ability of those areas to retain a favorable visual organization is very important. And for some reason, an area rug perhaps ten feet square will serve to hold those groups of furniture together.

Furthermore, at night, when the janitors clean up the floors, there is a basis for replacing the furniture in its original, organized position. Otherwise the janitor doesn't know where to put it. Another reason for smaller area rugs is that, in future maintenance, they are not so costly to replace. They are easy to clean, and although there are many detergents and various types of cleaning agents in which you can clean carpets on the floor, it still is an advantage to just be able to pick the rug up and send it out. So, over a period of many years an area rug is a very small investment to coordinate the continuity of furniture within a library.

There is also the matter of color. The use of carpeting is one of the most effective ways of introducing color into a large, open reading area. If you have an essentially neutral or very light floor, such as we have in this room, you can occasionally take smaller area rugs, in relatively bright colors, and you spot color throughout the building. In doing this, you introduce an atmosphere of cheerfulness. So, I am quite an exponent of area rugs in certain cases. Of course, there are occasions where abuses occur. Also, in this part of the country, especially, there are difficulties with mildew and the like. So far as wall-to-wall carpet is concerned, again, I am still studying the documentation of the American Carpet Institute. They put forth a very convincing argument. I am not against wall-to-wall carpeting and yet I am not quite completely for it. We have gone into it very recently in one or two libraries, and none of us are completely pro or con.

There may be some representatives of the carpet industry here who may be able to put up very convincing arguments. There may be some people very much against it. The basic argument of the Carpet Institute in favor of wall-to-wall carpeting is this: granting that the initial cost of installing carpeting is slightly higher than that for high-quality vinyl tile, the cost of maintenance for carpets over a period of five or ten years is considerably less than maintenance costs for tile. Personally, on wall-to-wall carpeting, I am not going to argue the point one way or the other. Perhaps one of the other members here might.

MR. GELLER: Miss Voigt, do you have a comment on this?

MISS VOIGT: You might be interested in part of a discussion that came up recently. We are working on a new public library and the library board had to decide whether they were going to specify carpet throughout on three floors or whether they would use carpet only in the administrative offices and the children's room—the latter only because they wanted the children to be able to sit on the floor. In discussing this, the board went along with the idea of carpet on all three floors, but suggested that the main aisle be of a hard-floor covering. This raised another problem: if you are going to use waxing machines on part of the floor, you are apt to get the wax on the edge of the carpet. I had that problem at home and, believe me, it is not easy to correct. After reviewing this thing in discussion, it was decided that they would use a hard-floor covering, or a tile, just outside of the elevator, but to use wall-to-wall carpeting for the rest of it.

Now, I am not at this stage suggesting the use of wall-to-wall carpet in every case. I think there are many questions to be considered. The people that do recommend carpeting, of course, emphasize the quietness of it. Things that drop make no noise. They also say that the public using carpeted rooms tend almost automatically to take better care of the rooms. Even children in schools with carpeting seem not to throw things around so much. Then of course, it also creates an elegant appearance in the room.

MR. POOLE: I don't know that I can add a great deal to what Mr. Van Buren and Miss Voigt have already said, but perhaps this might interest you. We have seen the same information, much of which Mr. Van Buren covered, from the American Carpet Institute, and I think we can suspect that they have some slight bias in promoting the use of carpet. Nevertheless, in some of the schools and in some of the libraries where it has been used, one of the big arguments for carpeting has been its excellent acoustical properties. Specifically, it is stated that, in using carpets on the floor, you stop noise where it starts. In at least one or two buildings we have heard about, they have been able to eliminate (and I have not been able to check back and find out how successfully it has been done) acoustical tile on the ceiling because they used carpet on the floor. This, obviously, represents a big saving. How well this has worked out, as I said we don't know. Shaker High School in New York, which I think was the first high school in the country to install carpeting, found a definite psychological effect on discipline. The high school principal at Shaker wrote a rather strong report some time ago in favor of carpeting in which he pointed out that, apparently, the children felt somewhat as if they were in their own homes: They treated the furniture more carefully and they were quieter; the usual loud voices, the loud talking seemed out of place. Pencils and other objects that were dropped did not make a noise on the floor. In short, their experience has been excellent.

The librarian at the University of South Carolina wrote to us some time ago that after thirty-three years of carpeting, they were still highly in favor of it. The Arcadia Public Library in California told LTP they would never go back to tile.

This does not mean, obviously, that there are only advantages in the use of carpet. Most of the people who suggest carpet recommend immediately that you buy an extra amount of carpet in order to replace sections which may become worn in front of doors or elevators, or where somebody spills a bottle of ink or something else which would cause spots difficult to remove. The American Carpet Institute's figures on cleaning, as Mr. Van Buren has pointed out, argue that the use of the carpet is justified because, over a period of five to ten years, the savings in reduced maintenance costs will more than pay the extra cost of the carpet. This does not take into account, however, the necessity for replacing sections which may become worn through unusually heavy traffic or because of stain damage caused by ink or other substances.

There are, as Mr. Van Buren said, a number of pros and cons, but certainly thus far, the people who have used carpeting are highly enthusiastic about it, so far as we have been able to determine. Some people have asked us here at this meeting about various fibers in carpeting. The experts agree that wool is the preferred fiber. There are a number of new synthetics, but these have not proved to be satisfactory for heavy traffic, or for long-term wear. Filament nylon was, for some years, still undergoing improvement. Within the last year filament nylon has been improved sufficiently so that it now can be used in a blend with wool, but wool is still the preferred material.

MR. GELLER: I have passed the word around to the panel members that, if they have any further comments they would like to add, they should, because we have come to the end of our questions. Mr. Metcalf, I think, indicated that he desired to say something.

MR. METCALF: I am speaking out of turn. I was very glad Mr. Poole brought up the question of replacement, and I think we need to keep in mind the difficulty of replacing a worn strip. Unless you've got a large stock of the original carpeting at hand, you may find it impossible to match the color. Furthermore, the color of the areas originally laid down and which were not replaced might have faded, which would create a bad situation. Mr. Van Buren can probably answer this for us: Couldn't you use a different color of carpet for the places where you are going to have very heavy traffic and where the wear is going to occur first and then be able to use a different but non-conflicting color for the main carpet? Of course, the main carpet will remain the same, but you could more readily replace the other. It might be a very small square yardage of carpet. I think if we planned in this way, we could reduce the cost of keeping the carpeting in good shape.

One other thing: I have found that the places that carpets wear most rapidly are on stairs and there, I think, it is partly because we have neglected proper padding on the stairs and at the edge of the tread. That is distressing enough when the stairs are open, but having the carpet wear out can be extremely unfortunate.

MR. GELLER: Thank you. We can probably devote a whole institute to the subject of carpeting, and I would guess that the next time we have such an institute, we will have had more experience with carpeting. In the meantime, will those of you who have had direct experience with all aspects of library furnishings and equipment please send the information along to Mr. Poole so that such actual experience data can be collected systematically.

MR. GELLER: Well, this brings us to the end of our questions. I want to express, on behalf of the audience, my deep thanks and sincere appreciation to the great talent and experience on the platform with us tonight.

MR. METCALF: I would like to say how much I appreciate what the Library Technology Project is doing in connection with furniture and equipment. Their information is going to help me on the book I am preparing for the Council on Library Resources. I hope you will continue to send questions into LTP so that, as they find the answers, I won't have to put them in the book.

MR. GELLER: Seconding Mr. Metcalf's suggestion, this Institute has been successful primarily because of all of you who have supported us by your questions, by your interest, by your willingness to spend your time in these concentrated sessions.

Mr. Poole and I feel encouraged to plan another Institute two years from now. There will be a Building Institute in Chicago, we think next summer, and then an Equipment Institute the year after. And to help us in this, if you have any comments and criticisms about the makeup of and arrangements for the Equipment Institute, they are most welcome. It would be a great help to Mr. Poole, I know, if you would send him your comments (or to me) about what we didn't do that you would like to have us do, and also what you liked about the Institute. We have heard lots of you say that you liked the Institute, but we also would like to have you go home and, in the privacy of your office, write us a letter to that effect, because it is the only way we know how we are meeting your demands and this is what we are here for. So, on behalf of Mr. Poole and myself, we do sincerely thank you. You have been a wonderful audience.

Our thanks to the University of Miami, to Archie McNeal and his staff, to the ALA staff, and to all of the participants who made this Institute so successful and so helpful.